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The Burnside Rifle.

In 1856 General Burnside, now the commander of the Army of the Potomac, invented and patented a breech-loading rifle. In 1857 a board of seven officers, appointed by the Secretary of War under an act of Congress, met at West Point for the purpose of subjecting to trial all the breech-loading small-arms in the country which might be submitted to their examination; about twenty different kinds were tried, and the board in their unanimous report gave the preference to the Burnside rifle. In 1858 a second trial was made at the same place of some twelve different kinds of breech-loaders, also before a board of army officers appointed by the Secretary of War, when the preference was again unanimously given to the Burnside rifle. When the war broke out, a company with a large capital was formed in Providence, R. I., for the manufacture of these rifles for the army, and at the present time they are being furnished to the cavalry at the rate of about 70 a day. After the soldiers began to use the gun in actual warfare a slight objection was discovered in the difficulty of removing the empty cartridge cases, but this was effectually obviated by a simple modification invented by Dr. Hartshorn, of Providence, and the arm is now giving perfect satisfaction to the officers and soldiers of the army. The rifle as now manufactured is illustrated in the accompanying engravings, of which Fig. 1 is a perspective view and Fig. 2 is a section of the breech.

Fig. 1

GENERAL BURNSIDE'S PATENT RIFLE.

Through the breech is made a vertical slot into which is fitted a block of steel, *a*, swinging upon a hinge *b*. In the block, *a*, is formed a conical hole, *c*, to receive the cartridge; the block being turned down into the position shown in dotted lines to permit the insertion of the cartridge, and then turned back into the position shown in the full lines before the gun is discharged.

Fig. 2

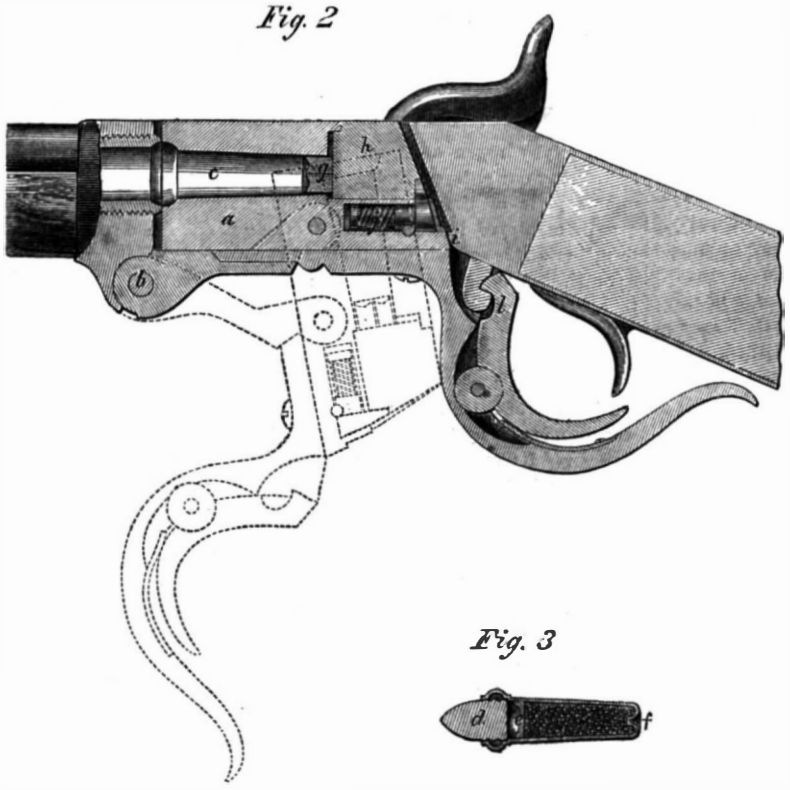

Fig. 3

The cartridge, Fig. 3, has a thin brass case for holding the powder; the conical shot, *d*, is inserted into the upper or forward end; a wad, *e*, covers the powder; and the flame from the percussion cap enters through an orifice at *f*, in the rear end; this orifice being closed by beeswax. The cartridges thus constructed are impervious to water; after lying under water a week they are fit for use.

As, when the gun is discharged the expansive force of the gases fits the cartridge case closely and firmly into its receptacle, it is necessary to loosen it before it can be removed. This loosening is effected by means of a movable bolt, *g*, which enters the block, *a*, at the rear of the cartridge. When the cartridge is inserted in its receptacle and the parts are brought into the position for firing, the bolt, *g*, is pressed backward, bringing the piece, *h*, to which the bolt is attached, firmly against the solid metal behind it; and then after the gun is fired, as the block, *a*, is turned down to permit the removal of the cartridge, the projection, *i*, presses the piece, *h*, and with it the bolt, *g*, forward, thus loosening the cartridge case, when by the action of the spiral spring, *j*, the bolt is pressed still further inward, and the cartridge case is forced out sufficiently to be easily seized by the fingers and removed.

As first made, the block, *a*, was hung upon only one hinge, *b*, but this carried it so low in the slot when it was turned down, that it was difficult for a soldier with large fingers to reach the cartridge case. Complaint having been made of this, the difficulty was removed by the introduction of a second hinge, by which the case is carried up in the position represented in the dotted line.

When the breech is closed, ready for firing, a strong catch, *l*, holds the parts in place, and this catch is loosed from its hold by the pressure of the thumb as the breech is opened, without any additional motion of the hand.

The bead in the cartridge case around the bolt is filled with grease, by which the shot is thoroughly lubricated; the grease being effectually protected from contact with dust or dirt.

The shot is secured in the cartridge case by the guidance of mechanism, and thus the axis of the shot is made to coincide precisely with the axis of the bore, securing an accuracy for this breech-loader equal to that of the muzzle-loaders.

Patents for this invention were secured, through the Scientific American Patent Agency, in England and France about the time the American patent was granted. Further information in relation to it may be obtained by addressing the Burnside Rifle Company, at Providence, R. I.

Licensing Engineers

A correspondent writing to us from Oxford, N. Y., makes inquiry regarding a statement in an editorial article lately published in this journal, respecting engineers' certificates. We would state in answer that, so far as we know, the certificates are only required by law in this city. It is a municipal ordnance, under the control of the Metropolitan Police Commissioners; and one which we, in common with others of the mercantile community, would be glad to see put in force in every town where steam is used. Perhaps our correspondent will use his influence in his locality to that end.

THE Mormons are turning their attention to the cultivation of cotton.

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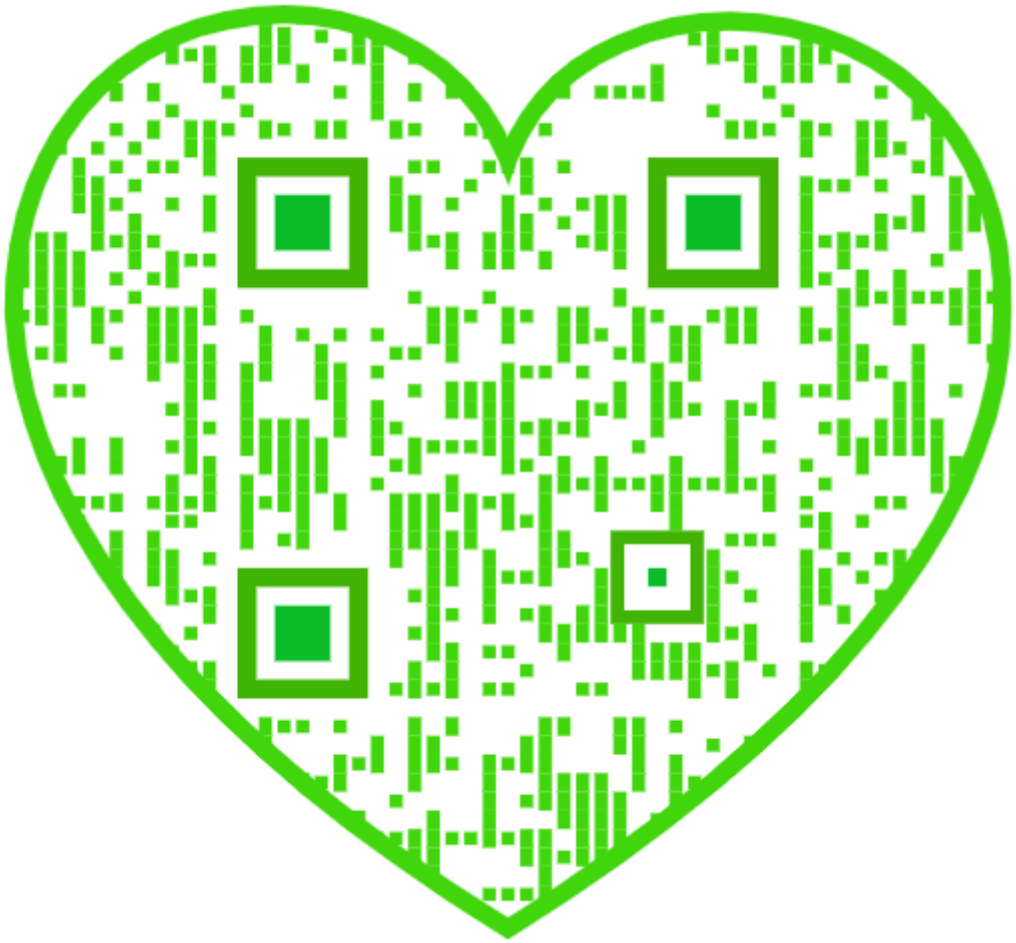

LAUNCH OF THE IRON BATTERY "KEOKUK."

On Saturday, the 6th ult., the iron-clad, turreted battery *Keokuk* was launched from the foot of Eleventh street (E. R.) This vessel is one which was projected by Mr. C. W. Whitney, of this city, and differs materially from any of the other iron-clads now building or about to be built. She is 159 feet long, 36 feet 3 inches beam, and has 13 feet 6 inches depth of hold. There are two fixed turrets and a short smoke-pipe visible above deck; these alone break the smooth surface which everywhere slopes to the water's edge. Below the water-line the *Keokuk* is an ordinary sea-going craft of good model; above this mark however, she has some peculiarities worthy of mention. The side armor extends 4 feet below the fighting draft, which will be about 8 feet 6 inches, and for a portion of the length, amidships, presents an angle of 37° to the horizon. This inclined armor runs up to the main deck on each side, which is but little wider than the turrets. The bow and stern of the *Keokuk* round away to the water, and present the same appearance to the eye that a wasp's body would immersed. The stinger however, is not in the same relative position. The deck beams are a continuation of the ships ribs, which are of iron 4 inches deep by 1 inch thick, placed 18 inches apart. Over these ribs a ½-inch plate is laid, and that relaid again with a 5-inch wooden deck; this latter is caulked water-tight and then armed with two ½-inch iron plates, somewhat similar to the Ericsson *Monitors*. The casemated portion of the vessel, 5¾ inches thick, is laid with iron 4 inches deep by 1 inch thick, placed 1 inch apart; the interstices being filled in with yellow pine. The remaining 1¾ inches are made up by the outside sheets. This armor is fastened on with countersunk bolts 1⅛ inches in diameter and 12 inches apart, secured inside with strong, six-sided nuts. The deck has only seven-eighth bolts through it.

The turrets, two in number, are stationary, and mount one 11-inch gun each. They are 14 feet in diameter at the top and 20 feet at the base, extending 7 feet above the deck, and twenty inches below it; upon a platform constructed at that line the guns are mounted. The turrets proper consist of wrought-iron skeletons, made of flat iron, 5 inches deep by 1 inch thick, placed edgewise, 15 inches apart and secured to a ½-inch sheet by 4 wrought-iron clamps 4 inches deep by 1 inch thick. The 15-inch spaces remaining inside are filled up with wood, and afterward covered with a thin, sheet-iron lining to make a smooth finish; outside of the turret-skin, ½-inch plate, the protection is the same as that of the casemates. Each turret has its own shot, shell and powder magazine, communicating from the deck, just underneath the tower, by hatches. In the after-end of the forward turret is the pilot-house, which is 2 feet higher than the main structure, where the helmsman controls the vessel by the usual steering apparatus.

The turret gun decks, 20 inches below the main deck, consist of a circular iron frame 6 inches deep by ¾ of an inch thick, supported by 12 wrought-iron beams 2½ inches in diameter. This frame is further crossed at regular intervals by 14 wrought-iron beams, also 6 inches deep and ¾ of an inch thick. At right angles with the latter a strong box girder, 12 inches by 18 inches across the angles, is riveted to the circular frame, being strengthened in the middle by a heavy wrought-iron column 5 inches thick. Upon the top of the 14 beams, previously mentioned, a wooden deck 5 inches thick is laid, to which the gun-ways are made fast. In the centre of the turret the gun is pivoted; three ports are made for it in the turret—two broadside and one aft or forward, as the case may be—through which it pays its compliments to the enemy. A lateral range of 8° and a vertical one of 10° can be obtained for the missile. From the lower deck, inside the turrets, two doors permit communication with the forecastle and also the engine-room and officers' quarters. There are two water-tight compartments in the vessel, one fore and aft, to which access is had by the usual man holes; these can be filled with water, if desirable, in a short time, and will, it is calculated, settle the ship one foot. The forecastle is large and roomy, so much so that 100 men can swing their hammocks in it. Alongside of the vessel, just behind the casemates, are the coal bunkers, and immediately inclosed by them and two fore-and-aft bulkheads, are the steam boilers. Before a shot can strike the latter it must pass through the inclined side, the coal and also the two stiff bulkheads or partitions, just mentioned; they are therefore very fully protected. The officer's quarters promise to be cool, well lighted, and thoroughly ventilated; as the lower part of the turret is entirely open, or can be rendered so, there will be, apparently, at all times a free circulation of air. They are also further ventilated by thirteen 6-inch deck lights.

The *Keokuk* is propelled by engines of 500-horse power, designed for her by Mr. N. A. Wheeler, of this city. They consist of two twin-engines, one upon each side, the cylinders of which are 23 inches in diameter by 20 inches stroke, worked by two return tubular boilers, of 3,000 feet fire-surface and 82 feet of grate surface, having side furnaces. There is also one of Sewell's surface condensers, having galvanized iron tubes. The engines are of the locomotive finish in respect to the fittings of the connecting rods, link-motion, &c. They drive a true screw, under each quarter, of about 7 feet diameter. A stout ram, 5 feet long, projects from the bow, which seems capable of doing some damage to an adversary. Our space warns us that we must omit other details for the present.

The launch was very successful. A delay took place owing to the cold weather, which hardened the grease upon the sliding-ways. As the vessel had but a slight inclination she was loth to start from her comfortable position. Once off, however, she glided down gracefully to the river, making a parting salaam to the assembled multitude who responded with vigorous hurrahs and hat-wavings. Mrs. Whitney, wife of the projector, christened the *Keokuk* as she was descending. A fine collation was prepared in the boiler-shop of the Works, to which, after the ceremonies were concluded, a large number of guests repaired. Toasts were given, and cheers proposed for Mr. Whitney, which were responded to by a Mr. Ryan, of California; Mr. Whitney's modesty preventing him from answering to the calls of his friends. The different engineering firms were represented by Messrs. Quintard, of the Morgan Iron Works, Mr. Thomas Faron, of the Navy Yard, Mr. Underhill, of the Dry Dock Works, &c. Navy officers were also in force on the occasion. Commodore Alexander C. Rhind will command the *Keokuk*, and we shall look with interest to her nautical and naval performances, and also endeavor to give our readers some account of the former.

CHEAP OXYGEN GAS---LIGHT AND HEAT.

The oxyhydrogen or Drummond light is produced by burning currents of hydrogen and oxygen gases upon a piece of lime. This is the light which is usually employed in exhibitions of the "magic lantern," and it is so brilliant that the eye cannot gaze upon it. A sphere of this light resembles a miniature sun, and could it be produced at a moderate cost and a very durable material in place of the lime obtained, it would be the best and most desirable of marine lights for dangerous coasts and for the illumination of cities and other purposes. This light was discovered by Dr. R. Hare, of Philadelphia, but it received its more general name from Lieutenant Drummond, who first applied it practically at night, many years ago, in making a government survey of Scotland. The oxy-hydrogen light also gives out a most intense heat, and it is eminently adapted to the reduction of the most fractious metals, such as platina, &c. In fusing common metals with the blow-pipe, atmospheric air is blown through the flame of alcohol, oil, and common gas, and thus a very intense heat is produced; but the temperature of such flame can be intensified five-fold by the use of pure oxygen gas in place of common air for the blast, because the latter contains only one-fifth of oxygen, which is the supporter of the combustion. Atmospheric air is composed of nitrogen, 79; oxygen, 21; therefore when it is used for the blast of a flame, and as a supporter of combustion, the great quantity of the inert nitrogen acts as a cooling medium, because it is heated with the products of combustion, and carries off a large quantity of heat. Could pure oxygen gas be obtained at a moderate cost, so as to be used for the blast of smelting furnaces and as a supporter of combustion for illumination, a complete revolution in many arts would be effected thereby. It would effect a great saving of fuel; and many minerals which are now held to be too fractious for common smelting operations could be reduced with ease and economy. All combustible substances burn with great vigor, and many of them with wonderful brilliancy, in oxygen gas. The most common way of manufacturing it has been from the chlorate of potash and the oxide of manganese, submitted to heat in a retort. Although oxygen is the most abundant substance in nature, the price of materials and the expense of manufacturing it have been so great, that it could not be made for less than from four to five dollars per hundred cubic feet—a cost which precludes its common use entirely. Chemists, metallurgists and others have long been in search of a cheap method of producing this gas, but hitherto without satisfactory results. Some of our late foreign exchanges, however, contain accounts of such a discovery by Mr. J. Webster, London, who has secured a patent, and a company has been organized to manufacture the gas and introduce the invention. The materials used for producing it are the nitrate of soda and the crude oxide of zinc. A description of the process has been given in the *Chemical News*, by J. H. Pepper, professor of chemistry. The materials, in the proportion of ten pounds of the nitrate of soda and twenty pounds of the crude oxide of zinc, were first moistened and mixed together, then thoroughly dried to expel all the moisture, and afterward placed in an iron retort, heated to dull redness in a furnace. From this quantity of these substances 32.968 cubic feet of a mixed gas was obtained, the composition of which was 59 per cent of oxygen and 41 per cent of nitrogen. Nitrous acid also passed over, but it was absorbed in the purifier which contained moist caustic soda. It is stated that the residuum of these materials are said to be valuable products, and may be sold so as to reduce the cost of gas. The materials used for making this gas are only about one-fifth the cost of those used to make oxygen gas in the common way. Pure oxygen gas, however, has not been obtained by this process; still it is much superior to common air for illumination. This has been determined by experiments. Judging from the nature and cost of the materials used and the results obtained, we conclude that an advance has been made in this department of chemistry, but other discoveries and improvements must be made before oxygen gas will be obtained for general use in the arts. We trust this notice will be the means of inciting others to investigate this subject at further length, as it is one of great importance and promises to be fruitful in useful results.

A Singular Shot.

A few days ago a paragraph appeared in the Boston *Journal*, headed "A Singular Shot," and stating that, at the navy yard at Washington a 130-pound solid shot fired from a 10-inch smooth-bore Dahlgren gun at the distance of 500 yards from the target, penetrated four inches of iron plating and ten inches of white oak planking. A correspondent at Washington, who witnessed the experiment, writes to the *Journal* in order that the facts of the experiment may be stated. He says:—"A 10-inch Dahlgren was charged with 30 pounds of powder and a 130-pound solid shot, and was fired by means of a slow match. The shot made a clean hole through the target, which is composed of one iron plate, 4½ inches thick, and six other plates each one inch thick, bolted to a framework of white oak planking 18 inches thick. The target may be about 500 yards distance. These are the main facts as I observed them. Our English and French friends won't think we have made much progress if, on extraordinary occasions, we can only get through four inches of iron and a 10-inch oak plank."

A Difference.—The annual pay of an English soldier averages $100, and that of the French $50. A French colonel (full pay) has $1,500, and an English $6,000. In France a vice-admiral has $8,000, in England $12,000. The French rear-admiral receives $6,000, and the English $17,000. Few of our army and naval officers manage to live as cheaply as the French naval lieutenant, who has to find his own uniform and food out of 120 francs a month, or less than $300 a year.

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Waste of Cities.

Paris throws five millions a year into the sea. And this without metaphor. How, and in what manner? Day and night. With what thought? Without thinking of it. With what object? Without any object. For what return? For nothing. By means of what organ? By means of its intestine. What is its intestine? Its sewer. Five millions is the most moderate of the approximate figures which the estimates of special science give.

Science, after long experiment, now knows that the most fertilizing and the most effective of manures is that of man. The Chinese, we must say to our shame, knew it before us. No Chinese peasant, Eckeberg tells us, goes to the city without carrying back, at the two ends of his bamboo, two bucketsful of what we call filth. Thanks to human fertilization, the earth in China is still as young as in the days of Abraham. Chinese wheat yields a hundred and twenty-fold. There is no guano comparable in fertility with the detritus of a capital. A great city is the most powerful of stercoraries. To employ the city to enrich the plain would be a sure success. If our gold is filth, on the other hand our filth is gold. What is done with this filth, gold? It is swept into the abyss.

We fit out convoys of ships, at great expense, to gather up at the South pole the droppings of petrels and penguins, and the incalculable element of wealth which we have under our own hand we send to the sea. All the human and animal manure which the world loses, if restored to the land instead of being thrown into the sea, would suffice to nourish the world.

These heaps of garbage at the corners of stone blocks, these tumbrils of mire jolting through the streets at night, these horrid scavengers' carts, these fetid streams of subterranean slime which the pavement hides from you, do you know what all this is? It is the flowering meadow, it is the green grass, it is marjoram and thyme and sage, it is game, it is cattle, it is the satisfied low of huge oxen at evening, it is perfumed hay, it is golden corn, it is bread on your table, it is warm blood in your veins, it is health, it is joy, it is life! Thus wills that mysterious creation which is transformation and transfiguration in heaven. Put that into the great crucible; your abundance shall spring from it. The nutrition of the plains makes the nourishment of men. You have the power to throw away this wealth, and to think me ridiculous into the bargain. That will cap the climax of your ignorance.

Statistics show that France, alone, makes a liquidation of a hundred millions every year into the Atlantic from the mouths of her rivers. Mark this: with that hundred millions you might pay a quarter of the expenses of the Government. The cleverness of man is such that he prefers to throw this hundred millions into the gutter. It is the very substance of the people which is carried away here, drop by drop, there in floods, by the wretched vomiting of our sewers into the rivers, and the gigantic collection of our rivers into the ocean. Each hiccough of our cloaca costs us a thousand francs. From this come two results—the land is impoverished and the water infected; hunger rising from the furrow and disease rising from the river. It is notorious, for instance, that at this hour the Thames is poisoning London.—*Victor Hugo.*

The Revolutions of the Stars---An Error Detected.

We take pleasure in publishing the following communication from the Rev. William Isaacs Loomis, of Martindale Depot, N. Y.:—

In the appearance of nature the times of the revolutions of the stars are so graduated to each other that, when one appears to set out from a given point in its diurnal and annual revolutions, the time of the apparent diurnal star will bring it to the same absolute point which is occupied by the apparent yearly star at the close of the sidereal year. The times of the apparent revolutions of the stars, as given in the accepted system of astronomy, involve the absurdity of a star being in two different places, a little more than one-fourth of the circle of the heavens distant from each other, at the same instant of time. From this it is certain that the astronomers' times of the apparent revolutions of the stars have no foundation in truth. Herschel says the *time* of an apparent diurnal revolution of the stars is 23 hours, 56 minutes, 4.09 seconds; and the time of the apparent yearly revolution of the stars is, in solar time, 365 days, 6 hours, 9 minutes, 9.6 seconds, which is equal to the time of the sidereal year. The proportion that these times bear to each other is that, in the time in which a star will make one apparent yearly revolution, it will also make, in appearance, 366 diurnal revolutions and an arc of 92°+. The result which follows from this should be that, if a star sets out from a given point in its apparent diurnal and yearly revolutions, at the close of the sidereal year, the apparent diurnal star will have reached a point 92°+ beyond the point at which the apparent annual star finishes its yearly revolution. To illustrate this, take, for example, the point where the circle of the ecliptic intersects the circle of the celestial equator; and suppose a star to set out in its diurnal course, appearing to move in the plane and circle of the celestial equator, and at the same instant to set out in its yearly course, appearing to move in the place of the ecliptic. Because the star is said to make an apparent diurnal revolution in 23 hours, 56 minutes, 4.09 seconds, at the close of 365 solar days, 6 hours, 9 minutes, 9.6 seconds, the apparent diurnal star will have finished 366 revolutions and an arc of 92°+, and the apparent place of the star in consequence of its diurnal motion will be advanced in right ascension 92°+ from the point at which the star completes its yearly revolution in the plane of the ecliptic. Hence from the accepted star time it is demonstrated that a star can be in two different places at the same moment; the intervening distance being a little more than one-fourth of the circle of the heavens! The absurdity of the demonstration is obviously a most serious interference with the astronomers' claim that the science of which they are the masters "is founded on laws which are immutable."

VALUABLE RECEIPTS.

TESTING AURIFEROUS PYRITES FOR GOLD.—It has been very desirable to obtain a simple method of determining the amount of gold in auriferous pyrites, because the aspects of the gold and the pyrites are so much alike that the one cannot be distinguished from the other with a lens. The exploring miners in California, Australia and other places, have been at a loss to find out the amount of gold in the auriferous pyrites which they have discovered; hence in many cases, they have mistaken pyrites for gold and *vice versa.* The following simple mode of examining auriferous pyrites is given by Lewis Thompson, analytical chemist, in *Newton's London Journal of Arts,* and he states it was furnished upon application to a miner who went to Australia a few years since, and who has lately returned to England quite wealthy:—

Having provided a common tea-cup or other similar vessel, cut a piece of card into a circular form, and of such a size that it will rest midway in the tea-cup: then take a small piece of the pyrites recently broken, and make a hole in the center of the card, just large enough to admit and retain the pyrites: now put into the tea-cup a small quantity of quicksilver, about the size of a four-penny piece, and place the card in the cup, so that the pyrites may rest a short distance above the quicksilver: next place the whole upon the hob or other warm (not hot) situation, and so leave it for half an hour; at the end of this time examine the surface of the pyrites with a lens, of the kind used by watchmakers and which are sold in London for sixpence or a shilling each: the particles of gold will now be of a white color, as if frosted over, and if the whole be rubbed with a camel's hair pencil or the top of a quill, the gold will assume a brilliant appearance like a mirror or the surface of a piece of newly-polished silver, while the rest of the pyrites will remain unaffected. It is then easy to judge of the comparative value of the ore.

PRESERVING PICTURES.—Many valuable oil paintings suffer premature decay from attacks of microscopic insects. The best way to prevent this species of decay is to add a few drops of creosote to the paste or glue that is used to line the pictures; and also to add some creosote to the picture varnish. Paintings should be kept in a pure dry atmosphere. Many valuable paintings that are hung against solid walls of masonry, in churches and other buildings, are subjected to a damp atmosphere, and the canvas becomes moldy. Old pictures which have become blackened, are restored by washing them with deutoxide of hydrogen, diluted in eight times its weight of water. The parts thus touched must be afterward wiped with a clean sponge and water.

The Colors of Flames.

In burning pure hydrogen gas upon a loop of fine platina wire, a white light is produced. In such a flame various substances emit different colors. Phosphoric acid gives a beautiful light green; sulphuric acid, a beautiful blue color; boracic acid an intense green; chromic acid a rose color, and molybdic acid a yellow-green flame. Nitric and nitrous acids give a bronze-green color, and muriatic acid a greenish blue. Of the alkalies, potash gives a rose-violet flame color, and soda an orange-yellow flame color, which in very large quantities appears pure blue; lithia affords a carmine red color, and baryta a blue-green flame. Strontia gives a beautiful rose color; this substance is chiefly used for this purpose in fire-works. The nitrate of copper gives a green flame; the chloride of copper, an azure blue. Every substance produces its own peculiar color or shade of color in flame; hence a knowledge of the colors of flames is essential to the chemist, and now forms a peculiar branch of chemical investigation.

Intermarriage of Deaf Mutes.

The question of the intermarriage of deaf mutes was the subject of a paper recently read before the French Academy of Sciences by Dr. Boudin, who took the ground that the infirmity is not hereditary. The parents of deaf and dumb children, he observed, are generally in perfect health, and, moreover, deaf and dumb parents not connected with each other by ties of consanguinity very rarely have deaf and dumb children. He quoted an observation made by Dr. Perron, of Besançon, of two brothers of the name of Vallet, splendidly constituted and enjoying the most perfect health, who married two sisters—their cousins german. The elder has had several children, only one of whom, now aged twenty, is deaf and dumb. The younger brother has had six children, the first, third and fifth of whom could hear and speak, while the second and fourth were deaf and dumb; the sixth, still in its cradle, does not seem sensible of any noise they may happen to make in the room. These cases are utterly in contradiction to the doctrine of inheritance.

MUSTARD.—The Sacramento (California) *Bee* says:—There were shipped from San Francisco last week, 234 bags of mustard for New York. It is known that the wild mustard, or the mustard which grows wild on hundreds of thousands of acres in southern California, counting from Santa Clara down, is superior to the English imported mustard. This home mustard is in general use in this State, and for many years it has been gathered by parties and shipped abroad. The supply seems almost endless, and the business of gathering it ought to be, and will yet be, when labor becomes cheaper, a leading one in the commercial interests of the State.

LAST Thursday a telegraphic dispatch was sent from New York city, between three and four o'clock in the afternoon, to San Francisco, and an answer received between six and seven in the evening!

SEVENTEEN THOUSAND PATENTS SECURED THROUGH OUR AGENCY.

The publishers of this paper have been engaged in procuring patents for the past seventeen years, during which time they have acted as Attorneys for more than SEVENTEEN THOUSAND patentees. Nearly all the patents taken by American citizens in FOREIGN countries are procured through the agency of this office.

Pamphlets of instructions as to the best mode of obtaining patents in this and all foreign countries are furnished free on application.

For further particulars as to what can be done for inventors at this office, see advertisement on another page, or address MUNN & Co.,

No. 37 Park Row, New York.

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AN ADDRESS ON THE PATENT LAWS.

Sir David Brewster recently delivered an introductory address at the opening of the Edinburgh University, from which we extract the following interesting passages on the subject of the patent laws:

"Among the subjects which occasionally arrest and agitate the public mind, there are few which immediately affect the position and interests of educated men. Such questions, however, have occurred, but they have generally been settled by the united wisdom of the Government and the Legislature, without any of those appeals to popular or party clamor under which great measures have been often abandoned or impaired. A question of this kind, however, has unexpectedly arisen respecting the amount of protection which inventors should receive from the Legislature; and there is, doubtless, no subject more important to educated men, whether their education has been completed in the school, the workshop, or the university. You are all aware that the author of any literary work, however small be its dimensions and however frivolous its subject, enjoys, by the laws of England, the sole right of publishing it for twenty-eight years, and during the rest of his life. The only tax exacted by the law, and that only for the benefit of the public, is the presentation of five copies to the principal libraries in the kingdom. The artist, the engineer, the draftsman, the geographer, the hydrographer, and the sculptor enjoy the same valuable right; and so complete is the protection afforded by the law that piracy is almost unknown and works thus secured constitute a property which can be as safely transferred as land or money in the funds. It is otherwise, however, with the inventor of new machines, new instruments, and new processes in the fine and useful arts. While the author can instantly dispose of his work or draw the profits which it may yield, the inventor must devote himself to the development and practical application of his invention. When his arrangements are complete, he applies for a patent and he receives a right to use his invention for fourteen years by paying fees and expenses which, half a century ago, amounted in many cases to £400 or £500. The right thus obtained was entirely illusory. His parchment, indeed, bore the Great Seal of England, but the patent could be refused, and the price of it forfeited, either from want of complete originality in the invention or from frivolous defects in his own description of it. In this state of the patent law, injurious to the interests of the public and ruinous to inventors, our distinguished Chancellor, Lord Brougham, directed his attention to the subject, and carried two bills through Parliament, which reduced the price of patents and removed many of the more obnoxious provisions of the former law. These improvements were generally acceptable, and though inventors were still dissatisfied with the large sum of about £150 or £200 which they had to pay, and with the imperfect protection which their patent secured, they nevertheless submitted to the operation of the law, in the hope that future legislation might improve it. Under these circumstances, men of science, and inventors of all classes, were startled with a proposal made by a distinguished engineer, that the patent law should be repealed, and that there should be something like free trade in inventions. In addressing an assembly of civil engineers at Sheffield, Sir William Armstrong stated that the dauntless spirit which, in matters of commerce, had led this country to cast off the trammels of protection had resulted in augmented prosperity to the nation, showing the injurious tendencies of class legislation when opposed to general freedom of action; and he expressed a hope that the same bold and enlightened policy might be extended, in some degree at least, to matters of invention. For his own part, he was inclined to think that the prestige of successful invention would, as a rule, bring with it sufficient reward, and that protection might be entirely dispensed with. Under the free trade of the present day, thus highly and justly appreciated, we receive the corn and the wines of one country in return for the iron and the coal of another; but it exceeds our comprehension how there can be free-trade between two parties, one of which is the small class of discoverers or inventors and the other the whole mass of society, who are not inventors at all, and who, with all the influence of numbers, wealth, and position, would instantly appropriate and turn to profit every discovery in science that had a practical bearing and every mechanical idea that could be embodied in an instrument or a machine. Between such parties as these there can be no interchange of ideas and no reciprocity of interests; and as there can be no dealings between them, there can be no freedom of trade in any sense analogous to that great commercial doctrine to which reference has been made. But even under the present patent laws, as they exist in every part of the Old and New Worlds, there is already something approaching to freedom of trade. Every foreigner can obtain a patent in England, and an Englishman enjoys a similar right in return. The producers of ideas, therefore, are in every country in the same relative position nearly as the producers of those commodities which are interchanged under free trade—the non-producers of commodities deriving analogous advantages under the law—the one from the importation of useful inventions and the other from the importation of the necessaries and luxuries of life. There is still, however, another variety of free trade in inventions which, I think, is the only one that deserves the name. Were a patent right granted at the cost merely of its registration to every applicant and continued with equal security during the same period as a copyright, every new idea—every scheme of ingenuity or adventure—would be brought before the public and elaborated for the use of man. Such a scheme may be expected in some future age, when statesmen may have learned to face problems before which they now quail, and to appreciate interests to which they are now insensible. Regarding all intellectual rights as equal, and as sacred as any other species of property, it is not easy to understand why they should not be placed under the same ægis. *Esto perpetuum* is the brand which God and reason have stamped upon whatever man's genius or man's industry has created for the good of man. If the rich or the barren soil which conquest has wrested from the savage or industry won from nature is protected with as much care as the life of its owner, why should we not equally protect the right achieved by genius, whether in the useful arts it creates for humanity new powers and products, or blesses our species with the divine creations of poetry, or eloquence, or art? If James Watt has bequeathed to us mechanism to bring water from its earth-bosomed springs, or iron from its stony bed, or coal from its fossil grave—if Milton has sung the loss and recovery of Paradise in strains moral, religious and sublime—why should not the philosopher and the poet enjoy the same right of property as a landlord who reclaims a moss, gives verdure to a heath, or makes the yellow grain wave over a beach of sand? I should hardly have been justified by the speech of Sir W. Armstrong in taking alarm at the revolutionary opinions which he has maintained; but it is well known that a Cabinet minister of high influence has given utterance to the same views, and a committee of Parliament has been appointed to report on the subject of patents in all their relations. The British Association was the first public body that took alarm at the new doctrines and boldly denounced them; and an inventors' institute has been formed in the metropolis to resist, by every legal means, any measure of spoliation that the Government may be induced to support. I have brought this subject under your notice in the belief that every educated man has a substantial interest in obtaining a due protection to inventors, and in the hope that in your debating societies you may regard this subject as worthy of discussion."

RAPID DRY COLLODION PHOTOGRAPHY.

In the practice of photography the pictures are usually taken on glass plates, from which prints are afterward obtained on prepared sheets of paper, by permitting the rays of light to pass through the glass plates and fall upon the prepared paper. A problem of great interest to photographers has been the discovery of a dry collodion process by which plates can be prepared and rendered as sensitive as by the usual "wet collodion process." By the wet process the plate is finally prepared and the negative picture has to be taken and finished on the spot where the view is taken. This is easily accomplished in a house, but the traveling artist, who takes pictures of the sublime and beautiful in nature, is required to carry a load of articles to operate by such a process. To avoid this he employs dry plates, but hitherto these have not been made so sensitive and certain as wet plates, hence they require to be much longer exposed to the light. As shadows and figures in nature are constantly moving; it is very essential to obtain sensitive plates. The following is the substance of a paper upon this very interesting subject, recently read before the British Association for the Advancement of Science, by Thomas Sutton:—

Dry plates have been produced by an improvement and have proved to be as sensitive as wet plates, and they have preserved their good qualities for many weeks. Their sensitiveness depends upon the accelerating effect of bromine in dry collodion, and in this respect an analogy exists between the daguerreotype and dry collodion processes. In the former a silver plate, simply iodized, is extremely insensitive, but when submitted to the fumes of bromine its sensitiveness is increased a hundred-fold, the same thing happens in those collodion processes, wet or dry, in which the free nitrate of silver is washed out of the film. A collodion film, simply iodized, and without free nitrate, is as insensitive as an iodized daguerreotype plate, but a bromo-iodized collodion film without free nitrate may be rendered as sensitive as a bromo-iodized silver plate. In the wet collodion process the most exalted sensibility is conferred upon a simply iodized film by the presence of free nitrate of silver; but free nitrate cannot be retained in a dry collodion film, because it not only crystallizes on drying, but by becoming concentrated as the water evaporates, dissolves the iodide of silver, and forms a curious and interesting double salt, the exact properties of which have not yet been fully investigated. The principle, therefore, of preparing a rapid dry collodion plate consists in using bromo-iodized collodion, and removing all the free nitrate, which is the element of instability.

But the image produced upon a bromo-iodized silver plate, developed with mercury, is extremely thin and superficial, as may be proved by transferring it to a sheet of gelatinized paper; and similarly, the image developed by pyrogallic acid upon a dry bromo-iodized collodion film is thin and too transparent to yield a good printing negative. It is necessary, therefore, to apply to the film a coating of some organic substance, in order to give density to the dark parts of the negative. Many substances have been used for this purpose, viz., gelatine, metagelatine, albumen, various sirups, gum arabic, infusion of malt, tannin, &c., and experimenters have almost without exception, exhausted their ingenuity in varying these preservative coatings, as they are called, instead of seeking in the use of bromide for the true accelerating agent. The preservatives named have not all the same effect, and besides affecting the sensitiveness of the film, they also determine the color of the finished negative; gelatine and gum giving a black, tannin a red, and albumen a yellowish color to the deposit in the dark parts. Much, therefore, depends upon the selection of a proper preservative, when the most exalted sensitiveness is required.

One more difficulty remains to be overcome, and it is this. When a collodion film has once been allowed to get dry, and is wetted a second time, it is very liable to split and leave the glass; or if a preservative has been applied to it, it is very liable to rise in blisters, which spoil the negative. But this may be prevented by giving the glass plate a preliminary coating of india-rubber dissolved in kerosolene.

The operations in the rapid dry process are, therefore, as follows:—

1. Clean the glass plate, dry it thoroughly, and apply to it a solution composed of one grain of india-rubber dissolved in an ounce of kerosolene.

2. Coat the plate thus prepared with bromo-iodized collodion, containing an equal number of atoms of iodine and bromine, added in combination with cadmium. There should be about 5 grains of mixed iodide and bromide of cadmium to the ounce of collodion.

3. Excite the film in a bath composed of 30 grains of pure recrystallized nitrate of silver, slightly acidified with nitric acid.

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4. Wash off all the free nitrate of silver, and pour over the film a preservative composed of 25 grains of gum arabic freshly dissolved in an ounce of water. Let it dry spontaneously, and before putting the plate into the dark slide, dry it again thoroughly before a hot flat iron.

5. Give the same exposure as for wet collodion.

6. Develop the picture by first wetting it with distilled water, and then pouring over it a developer consisting of 1 ounce of distilled water, 2 grains of pyrogallic acid, 2 scruples of glacial acetic acid, and a few drops of a weak solution of nitrate of silver. The image appears immediately, and very soon acquires the necessary intensity.

7. Fix the negative in the usual way with a saturated solution of the hyposulphite of soda or lime, and when dry varnish it with spirit varnish.

Negatives taken in this way are equal in every respect to those taken upon wet collodion plates, and the process is as simple as any of those which are now employed for slow dry plates.

Upon the reading of the above paper, Mr. Maxwell F. Lyte made the following remarks :—

"My experience having been somewhat considerable in the use of dry collodion, I venture to make a few remarks on that subject. There is no doubt of the fact that a combination of bromide with the iodide of silver is decidedly advantageous as an accelerator in the case of sensitive dried films of collodion ; but that this introduction of bromine should in any way be looked upon as new, when employed in this manner, is a mistake. Bromides have been very long employed in landscape photography, as a useful adjunct. One thing seems certain, that where greens form one of the prevailing colors in the picture, their impression is most decidedly facilitated. The proportion of bromide proposed to be introduced is, in my opinion, rather too large—one part in four of iodide being the proportion which I find to work best. The use of gum arabic as a preservative coating, combined, with a very small portion of honey, was mentioned by me in the journal of the Photographic Society of Paris many years since, but subsequently discarded as giving a tendency to fog ; but perhaps my decision in this respect may have been hurried, as I may not have washed the plate thoroughly enough, and certainly the proposed acid nitrate bath in which Mr. Sutton renders his plates sensitive, is likely to diminish this fogging tendency. This fogging it was which induced me to substitute the metagelatine for the gum arabic, which I subsequently did. Now, however, I am led to believe that the following modification of the resin process employed by the Abbe Desprats is the simplest and best process for dry collodion :—Add to the collodion one-fifth per cent of the resin of scammony, that which has been purified and bleached with animal black is to be preferred. Sensitize in a bath of seven per cent nitrate of silver, slightly acidulated with acetic or nitric acid ; wash the plate thoroughly in clean rain or distilled water, to which has been added 0·1 per thousand of common salt or chloride of ammonium, and let the plate become dry in a place thoroughly free from dust. The exposure is less than that required with any other dry process with which I am acquainted, and is not above one-half more than that required for moist plates. The development should be performed by first moistening the plate with distilled water, and then pouring on a solution containing one part of pyrogallic acid, ten of acetic acid (glacial), and five hundred of water. Fix with a solution containing about one of cyanide of potassium to a hundred of water. It is not absolutely necessary to employ for the first washing bath distilled or rain water, with an addition of chloride. The second washing should always be performed in water as pure as can be obtained—in distilled water if possible—and especially the presence of any bicarbonates is to be avoided. Gum arabic is the lime salt of a very weak acid. In contact with nitrate of silver it is decomposed, with formation of the gummate of silver ; but no such double decomposition takes place when it is placed in contact with the bromide or the iodide of silver. The action of light, however, on these latter compounds is to eliminate their acid element and separate the silver, and the iodide and bromide set free would tend to fix themselves on the lime in the gum. If the washing be not thoroughly performed, however, gummate of silver will form, which blackens in contact with the developer, even without previous exposure to light. It is, therefore, with much propriety that Mr. Sutton insists on a careful washing of the plate after sensitizing and previous to the application of the gum."

THE GRAPE CURE.

Germany is distinguished for originating several curative systems which have become popular "all the world over." Homeopathy and hydropathy are now very generally practiced in the treatment of many diseases to which poor humanity is subject. But there is another system practiced in Germany which has not yet become general, nor is it very widely known, but which deserves attention, as it appears to be based upon common sense principles. One reason for its practice being still limited is owing to the fact, that it cannot well be practiced but in vine-growing districts ; still as there are many of these in America, it may be practical in various sections of our country. The system consists in the treatment of patients with grapes, as constituting the most of their diet for a certain period. It is also practiced with a due regard to living in a healthy and beautiful locality, and combining with this pleasant exercise in the open air. Durkheim on the left bank of the Rhine, in the Bavarian Palatinate, is the headquarters of the grape cure in Germany. There are other places where it is also practiced, such as at Vevay and Montreux on the Lake of Geneva, also Meran in the Tyrol, but Durkheim enjoys the most fame. The vine is cultivated to a wonderful extent in that district, but the grapes are principally used for the table, and are not so highly esteemed for making wine as some others. About fifteen different sorts of grapes are cultivated at Durkheim, but those which are most commonly used for the treatment of patients are of two sorts, called the Gutedel and the Austrian. They are both white ; their skins are very thin, and they are sweet and well-flavored. The black Burgundy grape, and the small dark-red Framiner grape are also used to a moderate extent. The former is similar to the black Hamburg, which is well known in America ; the latter is a sweet aromatic grape, little known among us. The Riessling grape, from which the most celebrated Rhine wines are made, is not used in the cure, as it is not held to be a good table grape. The sweetest grapes are always chosen, as an excess of acid interferes with digestion, and it also affects the teeth and mouth injuriously. The acids in grapes are the tartaric, malic and citric. There are also albumen, gelatine, gum, tannin, the oxide of iron and potash in grapes. Durkheim is a fashionable watering-place, like Saratoga, where persons congregate to partake of the mineral water for the restoration of health. The grape cure season commences about the middle of September and lasts nearly to the end of October. Persons afflicted with bronchitis, pneumonia, a scrofulous constitution and tubercular consumption in its earlier stages, come to Durkheim yearly from all parts of Germany. It is a beautiful place, and at the castle there is a garden where the invalids congregate in the open air and where a band of music plays at the regular hours appointed for eating the grapes. Each invalid with a small basket in his hand goes up to the tables where the grapes are sold and purchases the quantity which he intends to eat. The amount taken daily by persons undergoing the cure varies from three to nine pounds, and they are sold for about five cents per pound. Persons commence with eating about three pounds per day and gradually advance to the limits of their appetite. It is usual to eat them three times a day, namely, at seven in the morning with tea or coffee and some bread for breakfast ; at eleven o'clock the greatest quantity is taken ; then between five and six in the afternoon the last meal is served up. The skins and seeds are not usually swallowed. Butter, fats, pastry and spiced meats are forbidden to the invalids. A free use of the grape is probably beneficial in the alleviation of many diseases. The action of the vegetable juices upon the human system is but very improperly understood. It is only by experience that the truth can be found out ; but the use of the grape—the fruit of fruits—is so natural that the grape cure commends itself to our common sense. As the grape is becoming very extensively cultivated in several sections of America, we expect that at no distant day we will have such villages among us as Durkheim. The first object to secure their success is the cultivation of the right kind of grapes.

A free use of the grape is looked upon with favor by many of the most sensible doctors in Germany. It is customary with them to send many of their patients to the grape cure districts, just as many of our physicians advise consumptive persons to seek more favorable climes in search of health.

Drawing and Rolling Metals.

Dr. Robison, in the *Encyclopœdia Britannica*, remarks :—"It is a very curious and inexplicable fact, that by forging a metal, or by frequently drawing it through a smooth hole in a steel plate, its cohesion is greatly increased. This operation undoubtedly deranges the natural situation of the particles. They are squeezed closer together in one direction ; but it is not in the direction in which they resist the fracture. In this direction they are rather separated to a greater distance. The general density, however, is augmented in all of them except lead, which grows rather rarer by wire drawing ; but its cohesion may be more than tripled by this operation. Gold, silver and brass have their cohesion nearly tripled ; copper and iron have it more than doubled. In this operation they also grow much harder. It is proper to heat them to redness after drawing a little. This is called annealing. It softens the metal again, and renders it susceptible of another drawing, without risk of cracking in the operation." Mr. Kirkaldy, of Glasgow, agrees with Dr. Robison as to cohesion and hardness, but avers that he was in error in stating that the general density is augmented. Instead of an increase, there was a proved decrease in the specific gravity of 0.70 per cent. in the bar specimen, and 0·36 per cent. in the plate specimen produced by the process of cold rolling. The most highly-converted steel does not, as some may imagine, possess the greatest density, the hardest steel being only 7·8152, whereas the softest is 7·8220. The specific gravity of puddled steel is less than that of some of the superior kinds of wrought iron.

Mr. Kirkaldy's experiment tallies very nearly with the received formula for the breaking strain of wrought iron. Here is his condensed table :—

	Highest. lbs.	Lowest. lbs.	Mean. lbs.	Tuns.
188 bars, rolled...	68,848	44,584	57,555	25¾
72 angle iron.....	63,715	37,909	54,729	24½
167 plates, lengthways.....	62,544	37,474	50,737	25¾
160 plates, crossways.....	60,756	32,450	46,171	

The breaking strain of 25 tuns for bars and 20 tuns for plates must be considered in reference to the working strain, or the load which can with safety be applied in actual practice. The working strain is estimated at a third to a tenth of the breaking strain. The British Board of Trade limits the strain to five tuns, or 11,200 lbs. per square inch.

A FARMER at Haubaurain, France, has been trying experiments with cod-liver oil in the fattening of calves, pigs and sheep. He gave two ounces to each pig daily, one ounce to each sheep, and an ounce and a half to each calf. The oil was mixed with bran and chopped straw for the calves, with bruised beans for the sheep, and with kitchen refuse for the pigs. In ninety days all the animals thus fed were fattened to a degree far beyond expectation ; their meat was white, tender and easy of digestion.

SILVER IN PHOTOGRAPHY.—Mr. Spiller, the superintendent of the Chemical Department at Woolwich, England, states that a full sized sheet of albumenized paper requires 50 grains of the nitrate of silver, but ten grains of it only are expended, and the rest may be recovered from the solutions. The actual cost for silver does not really exceed two or three cents per sheet, and the other chemicals required amount to about the same.

A POOR CORPORATION.—The New York *Evening Post* says :—We understand that the New York Gas Company has privately declared a cash dividend of 100 per cent, as well as a scrip dividend of 33 per cent. This is the concern which alleges that it is too poor to pay the Government tax, and seeks to extort it from the consumers of their gas !

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Correspondence

Fabulous Walled Lake in Iowa.

Messrs. Editors:—Having read an article some three years since, in regard to a wonderful walled lake in Wright county, Iowa, which I see repeatedly published lately, I wish to give you the facts in regard to it, which I am prepared to do from personal observation. Having occasion to visit that part of the State in 1860, I made inquiries of "the oldest inhabitants" of Clear Lake City (on the beautiful Clear Lake of Cerro Gordo county, some forty miles from Wall Lake) in regard to it, and they smiled at the *sell*. But in traveling from that point to Fort Dodge, I went some twenty-four miles from the direct route to see for myself the wonders of Wall Lake. I passed along its banks far enough to bring the whole shore in distinct view, and could discover nothing in the least remarkable from what is frequently to be found in the lakes of that region, or what could easily be accounted for by those who are familiar with the action of the ice on the shores of those northern lakes. The writer of said article, I presume, was nearly correct in regard to its area; but its shape is rather irregular and the wall is broken and uneven; in many places it entirely disappears in a sand and gravel beach. In no spot could I discover anything more than a low and irregular line of pebbles and boulders intermixed with earth, from two to six feet in hight, which had evidently been shoved up by the expansion of ice. In parts where there was not sufficient coarse stone or boulders to retain the earth and gravel, the action of the water during the summer would wash down the work of the winter's frost, and leave a beautiful beach from the margin up to the alluvial soil, which is from two to ten feet above the water. I have seen walls in every respect similar on other lakes of that region, which seem to be composed of drift and lost rock which abound in that vicinity.

This ice action is quite considerable and remarkable in these extensive lakes; it frequently forms to the depth of two feet or more, and the expansion of a mile or so of surface acts with great force on the banks, lifting up large masses of frozen earth and boulders weighing tuns and shoving them several feet from the shore, and during very sudden and severe changes its motion is often perceptible to the eye.

This walled lake seemed to be shallow, as the most of its surface was shaded with a growth of flags and rushes; it also appeared to be the paradise of ducks and geese; it might just as properly be termed a large goose-pond as a lake. I discovered no apparent outlet and saw no indications of its overflow or change of level. G. W. Bell.

Croton, Mich., Nov. 24, 1862.

Gun Cotton and Gunpowder.

Messrs. Editors:—In the Scientific American of Nov. 29th, I observe that Professor Seely stated, at the Polytechnic Association, that "If some gun cotton is pulled out loosely, and some powder sprinkled on it and a match is applied to it, the cotton will burn without setting the powder on fire. This is owing to the fact of its burning with a flame in which the heat is not intense." This broad statement, if not fully explained, might lead to very unhappy results. Take grain powder and bruise it, place it over or under gun cotton, fire the cotton, and the gunpowder explodes. The very fine particles of powder being unpolished, the heat is more readily absorbed. As common gunpowder is a very poor conductor of heat, and the flame is of low intensity and short duration, the grains are only surface heated, and of low temperature. But the finer particles of powder are, to use a very unphilosophical phrase, "all surface together," and each has an atmosphere which tends for the time being to cause the particles to retain a high temperature and thus explode.

Take the very fine shavings of gutta-percha, and pour on them, in a glass vessel, equal parts of nitric and sulphuric acid; the gum and acid will respectively decompose each other, and give off the strong fumes of musk. By this means artificial musk might be obtained. Thick pieces of this gum are readily desolved thus by using a little heat. In our standard works, European aud American, it is stated that gutta-percha is acid-proof; you may indeed boil it in common nitric and nitro-muriatic acid, and but little change is effected.

While I am in the way of criticizing, allow me also to say (in relation to an excellent article that appeared in the Scientific American on the bleaching of engravings, from the pen of a Boston professor) that the best mode of using chlorine is to use it free of lime in water. Lime is more soluble in cold water than hot. The chloride of lime and water will always deposit a little lime on an engraving, and to an "expert" the dark parts will have a gray appearance. Pure chlorine and water (soft) should be kept in the dark, for light will decompose the water, and then weak muriatic acid will be formed. Chemists in England have it for sale free of lime for this express purpose.

Thomas Taylor.

Washington, D. C., Nov. 29, 1862.

Moist Sensitive Photographic Plates.

Messrs. Editors:—It has long been an object with photographers to keep prepared sensitive plates moist longer than ordinary, as it is well-known that in a dry atmosphere, in doors or out, a sensitive plate will crystallize in a few minutes and be rendered unfit for use. My remedy is this:—Take newly-made plate frames and varnish them with gum shellac dissolved in alcohol, until the wood is thoroughly saturated; after being dried, immerse them in water for an hour, take them out, drain and wrap them in a wet towel, and place them in a box made of wood or leather with a close lid. The towel should be wet daily and the frames kept in the box. By these means, with a nitrate bath of thirty to thirty-five grains, I have no difficulty in keeping the plates two or three hours or more. I have had many inquiries about my process, upon the supposition that there was some secret in the preparation of the plate; but it consists in preventing the evaporation of the moisture, and that is effectually done by the above method. F. W.

Petroleum for Oil-stones.

Messrs. Editors:—I have an old stone very much soaked and gummed up with oil, so much so that my plane iron would slip over it without sharpening. I took to using petroleum oil on the stone, and it seems to work first-rate. It draws the oil out of the stone, and has a tendency to make the iron or chisel cling to it, which greatly facilitates the whetting.

C. G. Austin.

The New Metal, Thallium.

Mr. Crookes, the discoverer of this new metal, gives the following description of it in the Proceedings of the Royal Society:—"Thallium in the pure state is a heavy metal, bearing a remarkable resemblance to lead in its physical properties. Its specific gravity is, however, higher—about 12. The freshly scraped surface has a brilliant metallic luster not quite so blue in color as lead, and it tarnishes more rapidly than this latter metal. It is very soft, being readily cut with a knife and indented with the nail; it may also be hammered out and drawn into wire, but has not much tenacity in this form. It easily marks paper. The fusing point is below redness, and with care several pieces may be melted together and cast into one lump. There is, however, generally a loss in this operation, owing to its rapid oxydation. The metal itself does not appear to be sensibly volatile below a red heat. I have made no special attempts at present to determine the atomic weight, although from two estimations of the amount of sulphur in the sulphide it appears to be very heavy. The figures obtained did not, however, agree well enough to enable me to speak more definitely on this point than that I believe it to be above 100. I may mention that I obtained this element in the pure metallic state and exhibited it to several friends as early as January last, and should then have published an account of it, had it not been for the reasons already mentioned. Thallium is soluble in nitric, hydrochloric, and sulphuric acids, the former attacking it with greatest energy, with evolution of red vapors."

Preservation of Wood by Charring.

M. Lapparent, of France, who has published a most interesting essay on the preservation of ship timber, proposes to char its surface as the most effectual way of securing it from rot for a long period. He says:—

By charring timber the surface is subjected to a considerable heat, the primary effect of which is to exhaust the sap of the epidermis, and to dry up the fermenting principles; in the second place, below the outside layer, completely carbonized, a scorched surface is found—that is to say, partly distilled, and impregnated with the products of that distillation, which are creosoted and empyreumatic, the antiseptic properties of which are well known. A bench, the legs of which had originally been charred to the depth of 19 inches, after remaining in the ground eighteen years, near a pond, was dug up, and found to be in such good preservation that it was difficult to get the point of a knife into the extreme end of one of the legs. On the other hand, vine-props of oak, driven into the dry soil close by, were rotten in one year. M. Lapparent's method, which is about to be applied to all the dockyards of the French empire, is to char by means of a strong jet of inflammable gas. A workman, in an average day's work of ten hours, would carbonize a surface of 440 square feet, and the expense would be three cents per 10 square feet. A little tar smeared over the surface facilitates the process, and prevents the timber from being too suddenly effected by the heat of the gas. But more than a mere thin coat of tar would do harm. In ship-building, gas-charring should be applied to every surface likely to be in contact with moist or stagnant air. In house-building, it should be applied to the beams and joists embedded in the walls or surrounded with plaster; to the joists of stables, cow-houses and laundries, which are affected by a warm, moist atmosphere; and to the wainscoating of ground-floors. For railway-sleepers, charred timber, when scraped, can be painted any color.

A New Nail-making Machine.

To the numerous features of interest contained in the machinery annexe, at the London International Exhibition, has lately been added a wonderful machine for making nails, the invention of Mr. C. Gustafson, a Swede. Iron nails hitherto used have either been forged or cut by machinery from sheet iron or iron wire. Nails thus made are necessarily costly; the first named by reason of the slowness of the manufacture, and the two latter by using too expensive material. This new machine supersedes all others by combining in itself the process of rolling, pointing, cutting off, and heading; and produces from bar iron an excellent nail at a very low cost. The rapidity with which the nails are produced by this invention is truly marvelous. Using bar iron three-eighths of an inch square, the machine, with the labor of only one man or even a boy, will turn out in a day of ten hours as many as 15,000 three-inch nails. The nails produced are of the very highest quality, being compressed by the rolling process, and always having the grain of the metal in the direction of the length. They are formed with fluted sides, which is the most advantageous of all forms, but very expensive to produce by any other process hitherto resorted to. By slightly altering and re-adjusting certain parts of the machine different sizes and forms may be produced. In working iron, the bars are heated red hot in a small furnace placed at the side of the machine; but as no fire is allowed in the exhibition building, the machine can only be shown working such metal as can be worked cold. The practical efficacy of these machines is placed beyond all doubt from the fact that they have been tested by the experience of two years' constant work.

While the *Monitor* was at Washington for repairs, her turret was found uninjured. Over the indentations on the turret, received at the engagement with the *Merrimac*, has been inscribed the name of the engagement, punched into the iron. She has now gone forth to future conquests, and her sides may hereafter be inscribed all over with the records of her victories.

Valuable iron mines have recently been discovered in Aroostook county, Maine, by those engaged in the geological survey.

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STEAM PLOWING IN ENGLAND.

We have received the November number of the Wisconsin *Farmer*, one of the most ably-edited and neatest in appearance of its class. If our agricultural interests do not make great progress during the next ten years it certainly will not be through lack of practical and scientific information, afforded by the press devoted to their development. The editor has lately returned from abroad; during his visit he witnessed a trial of steam plows, and has published a graphic account of it, the principal part of which we reproduce for the benefit of our readers :—

Just before reaching the spot, a short turn in the road brought us up suddenly before an iron monster, with heart of fire and breath of steam, snorting and dashing up the hill, like the very devil of the olden time! A shout and a bound, and we left the road to his unembarrassed progress. This singular looking creature proved to be Aveling's agricultural locomotive engine. It had been sent a mile distant for wood and water, and when its wild scream first startled us, it had in train several tuns of these essentials, though moving up the steep grade with all the majestic ease of an elephant drawing a light barouche. We afterward saw it climbing steep hills in a stubble field, with its train full of curious spectators. A single engineer directed its movements with perfect facility, causing it to make graceful curves or short turns as occasion required or pleasure dictated.

This engine has a patent extra-large boiler fitted with thirty-seven 2¾-inch tubes, external plates of the best Butterley iron, fire-box and tube plates of Bowling iron, with extra stays for high pressure. The fire-grate measured 31 inches by 34, and is suitable for wood or coal fuel. The cylinder, 10 inches in diameter, is surrounded by a jacket and placed on the forward part of the boiler; by which arrangement priming in ascending steep inclines is prevented. The crank shaft is of common iron. The engine is fitted with improved governor, reversing link motion, patent tender and water tank, under foot-plate, driving chain, and gear, steam-pressure gauge, extra lock-up safety valve, steam jet blower, firing tools and wrenches, driving wheels 5 feet 6 inches in diameter, 12 inches wide, patent steerage and screw break for descending inclines. It is remarkable for simplicity and power—being capable of drawing 10 tuns up an incline of 1 foot in 6 and is easily managed by any ordinary engine-driver.

But what of the steam plowing? The two prominent plows in England are those of Fowler (of Cornhill), the original inventor of the steam plow, and of Messrs. J. & F. Howard, of Bedford. Both of these, together with others, engaged in this trial. Fowler's came first in order and shall, therefore, be first described.

As we entered the field the engine and windlass were stationed on the left headland, the self-moving windlass on the right. Between these the plow—which consists of a diamond-shaped iron frame, on wheels, but so bent in the middle that one end is up in the air while the other is on the ground, and of 8 plows, 4 on each end of the frame—is pulled backward and forward; 4 of the plows being so pointed as to work in one direction, while the other 4 pointing in the opposite course are waiting to do their work when the machine returns. In this way all turning about is avoided.

The engine appears like an ordinary locomotive farm engine, except that it has, under the boiler, a clip-drum for hauling the plow. The rope used is made of wire and is kept from dragging on the ground by simple supports easily handled by a strong boy.

The anchor consists of a "sheave" or clip-drum on three disk wheels, which by cutting into the ground prevent the whole concern from being dragged toward the engine. Upon the top is placed a box into which weights may be placed to cause the disks to sink deeper than they otherwise would, if required.

The soil in which this plow was working is a gravelly loam, not particularly favorable to success, yet good enough. The work was well done—the furrows well turned, and about 6 inches deep. Time required to plow an acre, about 75 minutes.

This plow also operated a cultivator, similar in construction to the plow, but with seven cultivator teeth or scarifiers instead of the four plows. It did its work well.

The Howard apparatus differed from the preceding in that the engine was stationary during the plowing of a given field. Instead of the clip-drum for winding and unwinding the rope, it has a separate reel resembling the hose cart which belongs to a common fire-engine. This reel is placed alongside the engine and operated by a shaft and wheel gear, which passes over the top of the two wheels which support the drum. The power is communicated to the plow—which resembles Fowler's—by means of a wire rope aided by four pulleys anchored to the ground; two of said anchors being located at the two corners of the field towards which the plowing is being is being done, and the other two so stationed as to enable the engine to pull the plow back and forth—themselves being moved up as the work progresses. This plow likewise did good work.

But the great question arises—is steam plowing in England economical? To this we are bound to reply: No, we think not. The best work that we have ever heard of either of these plows doing was ten acres in ten hours; and this is remarkable success. Six to eight acres per diem is probably the average. And when we consider the cost of the apparatus—$1,500 to $2,000; though the engine may be used for other purposes—the wear and tear of ropes and machinery, the consumption of fuel, the number of men employed and the liability to delays by breakage and other derangements, it looks to us like small results for the investment.

Such work as we saw could have been done equally well by four men with each an ordinary Yankee plow and one span of horses and at an expense of, say, $10; while here were employed an expensive engine—costing more than eight horses and of much less general use on the farm—a horse and cart to supply fuel and water and eight men. But it is furthermore fair to infer that on a trial such as this was, more and better work would be done than would be practicable as the average; so that it is probably more nearly correct to offset three men with plows against the steam apparatus, instead of four. Such being our premises, we cannot get the consent of our judgment to endorse the steam plowing of England as economical, unless it be on very large estates and under peculiar circumstances. We stick to the idea, however, and shall continue to hope for its full realization, at some day, on our glorious western prairies.

Sulphur in Coal Gas—Red Lime Salt.

The following extracts from the London *Journal of Gas Lighting* are portions of a paper read by the Rev. W. R. Bowditch, F.C.S., before the Royal Society :—

Gas which has been purified at the gas-works by lime, and which contains 20 or 30 grains of sulphur in 100 cubic feet, may be passed for a considerable time through a tube containing cold slaked lime without producing discoloration; but, if the same gas be charged with a minute quantity of bisulphide of carbon vapor and passed through the same lime-tube, the lime becomes yellow and green from the decomposition of the bisulphide of carbon.

If, instead of passing the gas through lime, it be passed through triethyl-phosphine, the beautiful red crystals which this base gives with bisulphide of carbon are not formed; but, if the base be dissolved in alcohol or ether, and the gas passed through this solution, the red crystals are formed, as Dr. Hofmann first proved. The alcohol or ether dissolves out the bisulphide of carbon from the hydrocarbon compounds of which it forms a part; and, when it is thus dissolved, it reacts with triethyl-phosphine.

Naphthalin, benzole, and other fluid hydrocarbons condensed from purified gas yield sulphide of hydrogen and other sulphureted compounds by simple distillation, yet these do not produce the well-known red crystals with triethyl-phosphine. They may, moreover, be digested for weeks in an alkaline solution of oxide of lead without producing any sulphide of lead. Under similar treatment, bisulphide of carbon yields hydrosulpho-carbonate and sulphide of lead in a few hours.

If the sulphureted fluid hydrocarbons condensed from gas be mixed with ammoniacal alcohol and heated, and an alcoholic solution of acetate of lead be then added, a black precipitate is formed after some time, which evolves sulphide of hydrogen upon addition of an acid. In this case, neither hydrosulpho-carbonate nor hydrosulpho-cyanide of ammonia is formed; yet it is well known that both are formed when bisulphide of carbon is added to ammoniacal alcohol. The erroneous view of the action of heated hydrate of lime upon the sulphur compounds in gas arose, I think, from the generally-received opinion that the blackening of lead salts by a gas is a proof that that gas is sulphide of hydrogen—joined on the fact that sulphide of hydrogen is one of the compounds produced by the action of the heated lime. If the sulphide of hydrogen had been separated from the mixture of gaseous compounds produced, the truth would have been apparent; but as, I believe, all experimenters have failed to separate them, the subject was obscure. After having failed in many processes devised by myself and suggested by others, I at last removed the sulphide of hydrogen, and showed that the blackening of lead salts is no proof of the presence of sulphide of hydrogen. Ordinary purified gas was passed over heated hydrate of lime, then through a considerable quantity of well-washed hydrated peroxide of iron, over lead paper, and subsequently through moist slaked lime. The peroxide of iron was slightly blackened, and withdrew every trace of sulphide of hydrogen : the lead paper became black, and the slaked lime yellow. This yellow lime gave a primrose-colored solution with water, which precipitated lead and silver salts brownish-red, thus showing the presence of impure hydrosulpho-carbonate of lime.

To be certain of the absence of sulphide of hydrogen, some of the yellow lime was treated with hydrochloric acid, and the gases evolved thereby were conducted into a solution of potash. The potash solution gave no reaction with nitro-prusside of sodium, showing the absence of sulphide of hydrogen, and when boiled with nitric acid gave no precipitate with a salt of baryta.

The hydrochloric solution of the lime contained a sulphur salt, which was obtained as sulphate of lime when nitric acid was added and the whole was boiled.

The blackening of the lead-paper in this case could not be due to sulphide of hydrogen, a that compound was absent. Nor, I think, is it due to the hydrosulpho-carbonic acid which passed over, and in contact with, the lead-paper, and was arrested by the lime. The red compound which this acid produces with lead salts is said to turn black rapidly; and the red compound produced by a lead salt and those of Berzelius and Zeise undoubtedly does so blacken, as also does that produced by a salt of lead and an alkaline pentasulphide. I have, however, obtained a red lead salt by the reaction of crystallized hydrosulpho-carbonate of lime and basic acetate of lead, which remained red after drying in the air at ordinary temperatures and exposure for weeks to the free atmosphere. I, therefore, conclude that the blackening of the lead-paper in the above case was not due to hydrosulpho-carbonic acid, but to some unknown or unsuspected compound.

In order to understand this matter fully, I commenced some investigations into the reactions of bisulphide of carbon with metallic oxides and other compounds, a portion of which I have now the pleasure of submitting :—

Slaked lime and bisulphide of carbon are mixed in a close vessel, and allowed to stand for three or four days. The lime at first becomes of a pale primrose color, which gradually deepens to a fine lemon yellow. Water added to the yellow lime gives a solution of a gold color, which precipitates salts of lead and silver reddish-brown and salts of mercury brown. These precipitates become black upon standing a short time. If the yellow solution be allowed to remain for a few days in contact with the lime, crystals are formed which will be very small and so distributed through the lime as merely to give it a fine salmon color. This lime-salt is of a bright ruby color, and it may be obtained in beautiful crystals.

Some of the reactions of this salt are remarkable; and more than one will exhibit the liability to error from the use of any but the most perfectly crystalline, dry, and clean specimens. Baryta-water added in excess throws down from an aqueous solution of the pure salt an amorphous, red, insoluble precipitate quite as brilliant in color as vermilion. If this be washed directly after precipitation, the color is retained for a considerable period; but, if left in the mother-liquor, it soon darkens. The washed salt dries a brick-dust red.

A very offensive suffocating gas is evolved during the decomposition of bisulphide of carbon by lime, which is injurious, if not poisonous; and, having suffered severely from breathing this and other noxious compounds derived from the same source, I think it right to call attention to it. I have formed a gas of similar properties by passing bisulphide of carbon and hydrogen together through heated lime, and should not be surprised if it prove to be the long-sought simple sulphide of carbon.

Slightly ammoniacal alcohol breathed from a cloth appears to be the best restorative for the severe depression caused by respiring the offensive gases and vapors above named.

The Destruction of Iron-clad Vessels-of-War.

It will be remembered by our readers, that an account appeared in this paper a short time since, concerning a new invention for destroying iron-clad ships, which was copied from an exchange. The inventor, Mr. Whittaker, of the United States sloop *Kearsage*, was sent to report to the Secretary of the Navy, and it would seem from the following statement that his invention had been approved and was about to be tested :—

Iron-clad steamer *Ozark*, 2, now in course of construction at Mound City, eight miles above Cairo, Ill., is about 110 feet in length, will have four propellers, and a turret, twenty feet in diameter, for two large guns. The boilers are in and the armor put on for about sixty feet on both sides. First Assistant Engineer James W. Whittaker is examining the vessel, with a view to apply his new invention for the destruction of iron-clad boats of all kinds, having been ordered there by the Secretary of the Navy for that purpose. It would not be proper to explain what the nature of this invention is; suffice it to say Mr. Whittaker has letters from chief engineers in our navy and other scientific men, including Captain Ericsson's principal engineer, wherein they express their utmost confidence in the plan, and recommend a trial speedily. Commander Porter is said to be highly delighted with it, and gratified that he is to have the opportunity of first testing it.

THE Robinson arms manufactory, at Richmond, is at work night and day—casting cannon, manufacturing Sharpe's rifles and other arms, large and small, for the Confederate Government.

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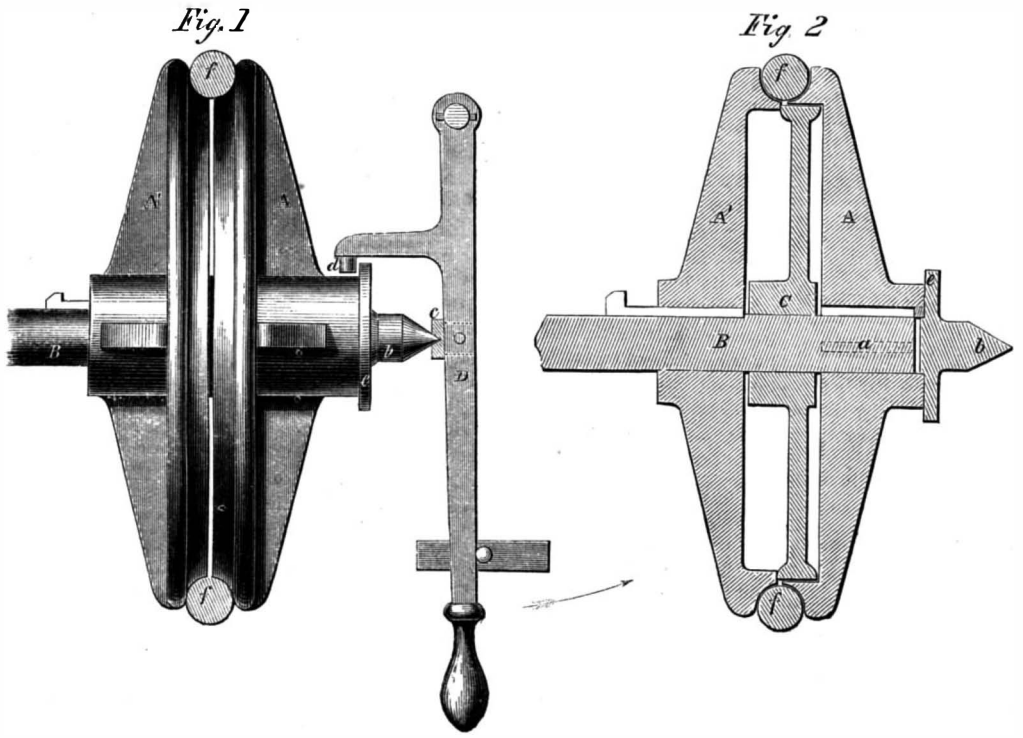
Improved Patent Clutch Pulley.

We illustrate herewith an ingenious device for shifting a belt from a fast to a loose pulley, as also for obtaining in a slight degree, a variable speed. Fig. 1 represents the invention; in it A A^1 are two pulleys. The one marked A^1 is keyed fast to the shaft, B; the other wheel, A, slides upon a feather, as shown in Fig. 2 by the dotted lines, *a*. Between the two wheels, A A^1, in Fig. 2, runs another pulley, C, which is fitted to revolve loosely upon the shaft. Attached to one end of the wheel, A, is a steel center, *b*, the point of which takes against a depression, *c*, in the lever, D. At right angles with the main part of the lever an arm extends which has a small pin, *d*, fitted with a friction roller projecting downward; this works against the collar, *e*, on the center beforementioned. The other end of the lever is secured at the top to the framing of the machine, or to the floor as desired. These constitute the working parts of the invention. The operation of it is simple. When it is desired to stop the lathe or any other tool that is driven by the belt, *f*, the handle is thrown over in the direction indicated by the arrow; the small pin, *d*, then strikes against the collar, *e*, and lets the belt down on the wheel, C, which, being loose, of course transmits no motion. Or, if it is necessary to run quite slowly or to start easily, the driving surfaces opposed to the belt upon the wheels, A A^1, may be lessened by increasing their relative distances apart to any required degree. The inventor states that this has been found a very excellent pulley for driving knitting machinery or other tools of that class.

Patented Sept. 15, 1861, by John Shinn, of Roxborough, Pa., and further information may be obtained by addressing him or Mr. Wm. Adamson, of Philadelphia.



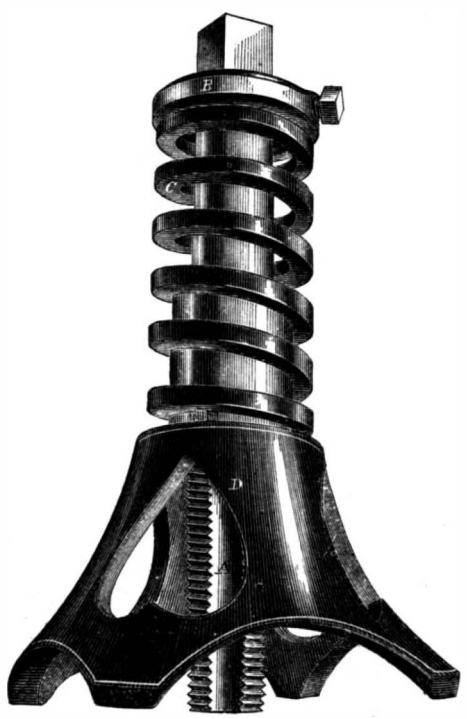
SHINN'S PATENT CLUTCH PULLEY.

"ARGYLLITE"—A NEW MINERAL.

A very interesting description of a new mineral is given in the November number of *Newton's London Journal of Arts*, by Lewis Thompson, M.R.C.S. For some years past a nickel mine has been worked on the estate of the Duke of Argyll, at Inverary, Scotland, and during its working several holes or borings were made to discover the extent of the vein. From these borings different kinds of minerals have been obtained and submitted to analyses, and were found to consist of sulphurets of copper, nickel, lead and arsenic, with the exception of one sample, which was detected by the Duke of Argyll himself, while on a visit to the mine, and who noticed that it possessed the power of reflecting light. It was found in very small quantities, but curiosity being excited to discover what it was, a portion of it was sent to Mr. Thompson for analysis, who discovered that it was composed of lead, vanadium and sulphur—a combination which, he says, was never before noticed. The crystals are very small, but by the aid of the microscope they were found to be twelve-sided or dodecahedrons. This discovery recalled a circumstance to Mr. Thompson, of a peculiar kind of copper ore which he had noticed twenty years before, and which was obtained near Fowey, in Cornwall. This ore had always to be smelted by itself at Swansea, and the copper obtained from it could not be rolled in sheets. The cause of this was not examined into at the time, but as the ore contained well-formed crystals, resembling galena, mixed with the copper, the thought occurred to Mr. Thompson that it might be the same kind of ore as that obtained at Inverary. Specimens of this ore were now subjected to careful analysis, and were found to contain lead, 60·8; vanadium, 20·5; sulphur, 18·7=100. The specific gravity is 6·04; the color is a dark lead-gray, with considerable luster. The form of the crystals is a rhombic dodecahedron. Before the blowpipe it decripitates slightly; with borax it affords a beautiful bluish-green bead in the reducing flame. It is acted upon with boiling nitric acid, and affords a bright blue solution. Very small quantities of it have as yet been obtained, but mineralogists may now be led to search for large deposits of it, which, if obtained, will prove valuable to those who may own the mines. Vanadium forms a beautiful dark blue color on silk, with tannogallic acid, and it is stated to be very permament. A sufficient supply of this metal has not yet been obtained to introduce it into the useful arts.

HADLEY'S PATENT TAP GUIDE.

We present our readers this week with an illustration of a device for guiding taps, patented through the Scientific American Patent Agency. It is, we think,



quite an original idea, nothing of the kind ever having come under our notice before. We have, however, often seen the want of such an apparatus, and can cheerfully recommend it as being a very useful tool. It is very light and simple in its action. A cast-iron stand, D, having a hole through its center to admit the tap, A, is provided with a spring, C, and a collar, B. When a hole is to be tapped, the stand is placed upon the work and the tap screwed as usual into the metal; as it is drawn in it presses against the collar, C, and this, through the spring beforementioned, throws the stand square up against the job, thus preventing any variation from a direct line. This invention is especially applicable to cylindrical surfaces, such as steam boilers, where it is impossible to get a square up to the shank of the tap, and it would be found useful in almost every operation for which taps are used, aside from machine-work. The inventor assures us that a very great saving of time—as we can readily imagine to be the case—is effected by this simple but efficient device. Further information can be had of the patentee, Mr. William Swain Hadley, at the office of the *Ledger*, Philadelphia, Pa.

Effects of Frost on Iron.

Mr. David Kirkaldy, of Glasgow, in a recently-published work detailing his experiments in testing the strength of iron and steel, also describes some experiments to test the effects of frost upon metal. A bar of Glasgow best bar iron, of ¾-inch diameter, was forged into ten bolts, and six of them were exposed all night to intense frost, in the month of December, 1860, then tested next morning when the thermometer stood at 23° Fah. The other four belts were kept warm all night and protected during testing. Three of the ten bolts were tested with gradual, and seven of them with sudden strains. With gradual strains the bolts exposed to frost gave way with 54,385 lbs. strain; the unfrozen bolts stood a strain of 55,717 lbs.—a difference of 2·3 per cent in favor of the latter. When submitted to sudden strains the difference was 3·6 per cent in favor of the unfrozen bolts. The frozen bolts had been covered with a layer of ice, but their temperature was much higher than that experienced in America. In Canada, where the temperature is very low during winter, one of the chief machinists on the Grand Trunk Railroad informed us that the effects of frost were destructive, almost beyond comprehension, upon their locomotives. Fine fibrous iron is the least affected in its strength by frost.

SIR DAVID BREWSTER ON THE PATENT LAWS.

We would direct attention to the elegant address of the venerable Scottish philosopher, Sir David Brewster, on another page. He points out in a graphic manner the absurdities of Sir William Armstrong in advocating free trade in inventions as compared with free trade in manufactures and natural products. The latter is free trade with the consent of the producers, the former is trading in the products of others against their consent. The one principle may be in perfect accordance with equity, the other certainly is not. The scientific attainments of Sir David Brewster have gained for him a world-wide reputation. He has always been a friend of the mechanic and inventor, and his object in bringing this subject before the University of Edinburgh was to enlist the judgment of educated persons on the side of right. He informed his audience that it was his firm belief that "every educated man has a substantial interest in a due protection to inventors." This sentence deserves to be written in "letters of gold."

A Hint to Oyster-eaters.—When too many oysters have been incautiously eaten, and are felt lying cold and heavy in the stomach, we have an infallible remedy in hot milk, of which half a pint may be drank, and it will quickly dissolve the oysters into a bland, cream jelly.—*Exchange.*

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VOL. VII. NO. 25.....[NEW SERIES.]....*Eighteenth Year.*

NEW YORK, SATURDAY, DECEMBER 20, 1862.

TO OUR FRIENDS.

NOW IS THE TIME TO FORM CLUBS.

With our next number another volume of this journal closes. We appeal to its friends in all sections of the country where mail facilities exist to endeavor to form clubs for the coming year. We feel justified in asserting that no other journal in this country furnishes the same amount of useful reading, and especially at the extraordinarily low price at which it is furnished. The present high price of paper has rendered it necessary that we should somewhat increase the subscription price of the SCIENTIFIC AMERICAN, but by availing themselves of our clubbing rates persons may obtain the journal on very reasonable terms even now. We are obliged to pay more than double the price we did one year ago for the same quality of white paper that the SCIENTIFIC AMERICAN is printed on, while the subscription price to clubs is only a fraction more than formerly.

The long winter evening must be relieved of its dullness, and we must keep reading and thinking, and thus be prepared to overcome temporary difficulties and open new channels of wealth and prosperity. Friends, send in your clubs; at least renew your own subscriptions promptly.

See prospectus on the last page of this number.

A FEW WORDS TO OUR SUBSCRIBERS ON THE CLOSING VOLUME.

The period has arrived when we are about to close another volume of the SCIENTIFIC AMERICAN. The subscription term of nearly five thousand readers will expire with the next number, and with more than our usual solicitude we request a renewal of their patronage. We feel encouraged in doing this as we have received the most gratifying assurances from all our correspondents, that the SCIENTIFIC AMERICAN has been conducted during the past year with even more than its former acceptability. It has furnished profitable and attractive information, we trust, to all its readers; and its illustrations and typography are unequaled by any other periodical devoted to the literature of the mechanical arts. It has been the aim of its publishers and editors to make it a creditable representative of American invention and enterprise, and it is universally admitted that it occupies this position and stands alone as the popular expositor and repertory of American art and science. It is a periodical respecting which our mechanics generally have said they "feel proud of it, and it deserves the patronage of all." As it is impossible to maintain such a large and cheap illustrated paper without a very extensive list of subscribers, we solicit all our readers to exert their influence and to labor more than usual to obtain for us new subscribers among their acquaintances.

The proprietors of the SCIENTIFIC AMERICAN will spare no effort to render the next volume acceptable to all its readers, and, if possible, superior to its predecessors. According to our established rule, the paper will be discontinued to all whose subscriptions expire, but we hope to experience the satisfaction of not being required to erase a single name from our mail books.

THE MANUFACTURE OF PRINTING PAPER.

The invention of movable types, stereotyping, the machine for casting type, and improvements in the printing press have undoubtedly tended to advance knowledge by the aids which they have furnished in providing cheap literature; and at the same time, it it is equally true that improvements in the art of paper-making have done as much in effecting the same object. But all the improvements in type-making, setting type, and printing would be of little avail in advancing knowledge, if a sufficient supply of paper at a moderate cost was not obtainable. Paper really forms the item of greatest cost in the art of bookmaking. Improvements in machinery for making paper and in the art of bleaching it, but above all a great reduction in the cost of the raw material—cotton—have reduced the cost of paper so much below what it was during the last century that books and periodicals have of late years been produced at an unexampled and gratifyingly low cost. A change, however, has suddenly come over that state of things. Printing paper which, eighteen months ago, was selling at six cents per pound has advanced in price three-fold; and as a consequence, all kinds of publications must be raised in price also. The causes of this are a depreciated currency, an increase of taxation; and, above all, a scarcity of the raw material—cotton—due to the war in our country, which has of course almost entirely suppressed the Southern cotton trade.

In the year 1857, cotton rags, of which paper is chiefly made, became scarce for a brief period; and paper advanced in price one-half of its former rate. Much excitement was occasioned thereby, and great energy was displayed in making efforts to furnish a substitute for cotton and linen rags. Newspapers and other periodicals then teemed with treatises respecting the manufacture of paper from straw, wood, flax cotton, and numerous other materials. Several good improvements were then undoubtedly made in preparing straw, grasses and wood for making paper; but when the price of cotton rags fell, all the new materials, except in a few cases, were abandoned. The present prospects, however, offer no hope of a sufficient supply of cotton rags being obtainable for several years to come; therefore some substitute is imperatively required, and, judging from the present prices of the raw material, it is reasonable to conclude that many substitutes can be furnished at less cost. Paper can be manufactured from every vegetable substance that contains fiber—the minute threads of vegetable tissue.

The oldest known paper was made of the papyrus, an aquatic plant growing in Egypt. The Chinese made paper from cotton before the Christian era; and the Arabians introduced the art of making paper from cotton and linen into Spain in the eleventh century. In 1719, Reaumer the French scientist, published an essay, in which he stated that paper could be made of wood and hornets' nests; and in 1734, Seba, a Belgian writer on natural history, stated that good paper could be made from the *alga marina* or sea-grass. In 1751, M. Guettard, of France, exhibited specimens of paper made of the bark, wood and leaves of trees, and also from various plants; and in 1756, during a scarcity of linen rags, paper was made of straw in Germany. In 1772, a book was issued in Germany by Jacob Christian Schaffers, of Ratisbon, which was printed upon sixty specimens of paper, made of as many different materials. There is a copy of this remarkable volume in the library of the Smithsonian Institution at Washington. Among the paper materials of which it is composed are hornets' nests, sawdust, moss, beech, aspen, mulberry, pine, hop vines, hemp, leaves of aloes, barley straw, wheat straw, broom corn, thistle stalks, and almost every material which has been proposed of late years as a substitute for cotton and linen rags in paper manufacture. We have adduced these facts to show that printing paper not only can be, but has been made of an innumerable variety of materials. The simple reason why they have not been commonly used is because paper could be made cheaper from cotton rags, owing to the low price of the latter and because they could be easily reduced to pulp. But this state of things has changed, and a favorable opportunity is now presented for the employment in paper-making of some of the materials above enumerated.

A few weeks ago, we published some account of the progress made in Austria, in the manufacture of paper from the fibers of maize-corn. We may learn something from Austria in the manufacture of both cloth and paper from maize fiber, as a substitute for cotton. We have lately examined a very beautiful pamphlet prepared by Professor J. Arenstein, and printed on paper composed of pulp made of maize, cotton and linen fiber. The quality of this paper resembled that of the fine "Indian wove" that is used for the prints of steel engravings. We are informed that a great number of works in the German language are now printed on maize paper at the Imperial Printing Office in Vienna. There are also establishments at Vienna and Schloglmule, where maize flax is spun and woven into cloth in considerable quantities. It is to this substance that we wish to direct particular attention at this time. There is no country in the world where the raw material for maize paper can be obtained in such abundance and perfection as in the United States. Its fiber—unlike that of cotton—is not free, but is cemented and imbedded in vegetable gluten and albumen, which require to be removed by chemical and mechanical processes before it is fit for making paper. What the expense of these processes may be we are unable to say; but the present high price of cotton rags warrants us in urging experiments with this material, in the confident hope that it may be economically employed in the manufacture of paper.

RELIEF FOR ENGLISH OPERATIVES.

Subscriptions to the fund for the relief of the working-classes thrown out of employment in Great Britain by the failure of the cotton supply are coming into the committee very rapidly. We are not of that class who are fond of doing a good deed and then publishing it, but we cannot help saying that the action of the Chamber of Commerce and Corn Exchange, in this city, is in striking contrast to that of many of the British merchants abroad, who seem to have let no opportunity slip to inflict injury and damage upon our commercial interests. The sum of $100,000 has already been subscribed for this noble object, and Messrs. N. L. & G. Griswold have generously tendered a new ship of large capacity, to carry abroad such provisions as may be contributed or purchased with the money collected toward relieving the suffering poor of Lancashire and other manufacturing districts in England.

Many of the railroad companies whose lines lead into New York have consented to transport over their respective roads corn, flour and other provisions, from the West to this city, free of charge; and it is expected that most of the Western roads will not be behind the Eastern lines of transportation in carrying forward this humane work.

It is hoped that half a million of dollars' worth of the products of the country may thus be poured into the lap of the suffering operatives of Great Britain. One of the publishers of the SCIENTIFIC AMERICAN is on the committee for receiving subscriptions to the "International Relief Fund;" and any contributions remitted to this office for the cause will be acknowledged, and the amount handed over to A. A. Low, Esq., the Treasurer of the fund in this city.

NATIONAL WORKSHOPS.

The Secretary of the Navy, in his recent report to Congress on the condition of affairs under his supervision, urges, among other matters, the establishment of national foundries and forges, wherein a heavier class of wrought and cast-iron work can be made than it is possible, in his opinion, to do in our private shops. We cannot see the utility of such a measure. It is true that at present the rolling mills and foundries of the country are urged to their utmost capacity in order to meet the demands made upon them for plating, &c.; but this is owing to the limited time allowed to the proprietors to fulfill their contracts, as also to the imperative needs of the country. To build and fit out a fleet of from forty to fifty

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iron-clad vessels and batteries might well tax the energies of any nation unburthened by war and with all its departments of government in a prosperous condition. How much more difficult is it, then, to do so when its force is paralyzed, and its energies are benumbed by the rampant treason and insubordination which is detected on every side! If it were a paramount object, in founding such national establishments, to secure a better and more thorough class of workmen than could otherwise be obtained, we could most heartily co-operate with the Secretary and second his efforts in all possible ways. Such is not the case. No better workmen can be found in this country, or in any other, than those which throng our private foundries; it is immaterial whether they be native or foreign. If they are exotic, they have been attracted hither by the superior wages they receive, as well by the increased social and political privileges they enjoy.

To establish national workshops is to offer a premium for all sorts of incapables, who may have political influence; and it is now, or has been until very recently, as difficult to obtain employment in Government yards as if there were no especial hurry or urgency. We have this statement from good mechanics who have sought for work and not found it, owing wholly to their being unacquainted with "some influential man in their district," or their entire ignorance of all kinds of political machinery. Not only can these facts be established, but it is also true that, at a period when the Government required the services of engineers of experience to fill acting appointments on the transport, dispatch, and iron-clad vessels and batteries which it was constructing, this same political shibboleth presented itself and became a grievous stumbling block in the way of men who really desired to serve their country. This error has been practiced to the injury of the acting navy appointments.

National workshops would not obviate the difficulty alluded to, by any means. How vast or how great would the Secretary have this or these establishments? Or how large a sum would he be willing to recommend Congress to appropriate for the purpose? How long would it take to build such a national workshop or shops, and how many subsidies would have to be provided for friends of the contractors? What length of time would elapse before the shops were stocked with tools, and what eminent firms would receive the whole contracts for supplying them? What antediluvian systems and what crab-like progression would be inaugurated in spite of the protests of the mechanical world outside of these fostering Government yards! It is not chimerical, in view of former experience in these matters, to assert that favoritism could be the rule, and that manifest injustice to a deserving class of men would be practiced.

It is hinted that the private establishments cannot turn out sufficient work to answer the demand, as also that they cannot make as large a class of forgings or castings as might be desirable. These are are singular assertions in view of the facts. At this writing, all the foundries in the country are busy on the heaviest kind of work—shafts, cylinders, boilers, all of the first class in respect to dimensions, are going forward on every hand. What Government could do more? There are steam hammers and foundry floors that will, in respect to the former, fabricate armor plates or shafts that no ship in the navy could carry; and as to the latter, there are pits where such slight things as condensers weighing thirty-five and forty tuns can be constructed. If there is any especial need for more massive products of better material than are now furnished, we are much in error.

But there is yet another point which would, we think, act materially against the successful operation of national workshops. And this is the contract system which the Government observes toward private establishments, and is properly insisted upon to guard against fraud and delay. How can there be any guarantee to the public, in a time like the present, that their interests are consulted as far as possible, equal to that now afforded by the spectacle of the private workshops in the various States in full blast night and day? Not only this, but heavy forfeits are insisted upon from the contractors, both as a spur to them and a remuneration to the people in case of non-compliance with the provisions of their pledge. How can a Government exact forfeit from itself?

We repeat that, in our opinion, the country has no need of national shops at this or any subsequent period, further than those which are necessary to complete repairs upon ships already in service; and we doubt very much whether these could not be better accomplished in private shops. The work which has been done for Government by first-class companies of the kind just alluded to, has always, or in most cases, been up to the mark, but can as much be said for those engines which have been remodeled under Government supervision?

An example of the incompetency of the Government to carry on such great undertakings is well attested in the miserable war-vessels which it has hitherto built. It is a fact that the best war-vessels now in the service were built by contract with eminent ship-builders.

BRING ON THE PAPER STOCK!

So earnest and pressing has become the demand for paper, and so imperative are the public needs, that the attention and ingenuity of nearly every interested person in the community is turned toward this subject. The high price of cotton and the scarcity of rags are urged by dealers as legitimate excuses for enhancing the cost and diminishing the supply of the manufactured article. We are inclined to think, however, that one very strong reason can be adduced for the increased price, which has been carefully kept in the background; and that is, the mania for speculation with which the nation is bitten, and which has infected this branch of commerce in common with most others.

Nine cents per pound are now paid by dealers for old newspapers, pamphlets, and, in fact, waste paper of all description, and we urge all who have, at this time, any store of the above articles, to bring them forth and consign them to the warehouse. Authors who may have on their hands tuns of unsaleable editions, the merits of which the public obstinately and mulishly refused to see, can now recover their expended time and treasure by retailing their brains, like beef or pork, at so much per pound. Let not these gentlemen imagine that their flowers of rhetoric will be lost, their sonorous periods fall dead and still-born, or that their passionate and eloquent appeals will be lost to fame. No! They will all be merged into one grand chaos, in common with thousands, yea, millions of others. Where is Train and his pamphlets? Now is the time for him to reap glory and profit—twin honors that seldom go hand in hand.

We heard, but the other day, of some persons who realized about seventy-five dollars as the proceeds of the sales of numberless books and waste papers of all kinds. In fact, for all we know to the contrary, there may have been some love-letters among them—some tender missives full of pathos and bathos—letters, yellow and dim with age, written over on all sides, crossed and re-crossed, signed with all sorts of romantic titles, breathing vows of affection unchangeable—epistles, in short, which were once priceless but are worth at this time—just nine cents per pound! It is well to be careful, however, in pulling out and selling this rubbish, as there is one instance on record, which occurred in Philadelphia, of a valuable ledger belonging to a merchant being found among a lot of old books sent to the paper dealer. Persons who live at a distance can collect all their stores of this kind, put them in a large washtub, wet them and mash them into a pulp or nearly so, then drain them entirely dry and send them to market. It is not necessary to put in anything beside paper—sand does not add to the value of the stock, nor, in fact, does any foreign matter, and dealers will rigidly reject all such as has the appearance of being adulterated. The old paper is put into the picker and torn to pieces the same as rags; the ink is then bleached out of it, and it is worked over in the usual manner. Probably no better opportunity will be offered in many years than is presented at the present time to dispose of lumber of this sort. It is a good time to clean the literary house.

White rags, at the present time, are worth twelve cents per pound and colored rags eight, and every scrap and thread that can be put in the market goes just so far toward answering the demand and consequently diminishing the price.

Bring out the rags and papers, then, and let us retain our reputation as a nation of readers!

ORDER IN THE ENGINE-ROOM.

There is much force in the old saying extant that "order is heaven's first law." We can testify to this virtue as being a most excellent one in conducting sublunary affairs. Most especially is it needful in places and situations that are full of complicated and costly machinery.

The duty of the engine-room consists of a certain fixed routine, in ordinary cases. In the morning the water is tried in the boilers, the fires are lit, the pressure evolved, and the engine or engines set in motion; supposing them to be in good order, they run without cessation, except such as may naturally arise in the operations of the workshop; it may be that a belt runs off, gets caught in the shafting, or similar occurrences. Now in all these details, from the first to the last, we must have order and regularity. If an engineer comes in of a dark wintry morning and has to light his fire, he must know exactly where to lay his hand on the match box. He must know where the lantern has been left, in what particular corner the shovel stands; in fact, possess that intricate knowledge of the situation which a blind man seems to have, intuitively, of his surroundings; only where the latter gropes, the engineer must use the means nature has furnished him, eyes and brains, and rely unhesitatingly upon them.

A well-ordered and well-kept engine-room is remarked at once by all persons, and the conductor of the machinery praised accordingly; but the sloven meets only with contempt. When we see the screw wrench kicking around under foot, the hammer half in the bedplate and half out, a flat chisel or two laying just where they will soon roll off into some part of the valve gear, half a dozen washers, some lamp wick, a little red lead, and ends of india-rubber in a heaped-up mess in one corner, intermingled doubtless with two or three old pipes—we have the key at once to the way in which business is carried on in that place. Such sights as these are by no means uncommon, and upon viewing them, we generally go to the cylinder, and it is oftener the case than otherwise, that we hear the rings *slatting* back and forth with each alternate stroke, or else giving the peculiar excruciating grunt that a cylinder emits when requiring lubrication. We assert, unhesitatingly, that an engineer who is careless of externals will be reckless of the internal condition of his engine and machinery. Read the papers unquestionably, when you can do so without interfering with your business; but do not sit down to do so with this or any other article in your hand before you have put things to right first. Slovenliness makes waste, and waste makes want—if not to you in one shape, it certainly will in another; and we would impress upon the engineering fraternity in general to keep their room and tools neat and in good order. There are many advantages arising from it which will be felt not alone in comfort and convenience but in the moral value of the lesson. Many and many a serious accident has been averted by reason of the engineer's knowledge of the situation of his tools. Many shipwrecks and breakages generally have been prevented by having the axe or hammer at hand, the chisels in the rack, the screw wrench in the locker, just where they can be reached at a moment's notice; instead of their being down in the coal bunkers, left in the boiler when the manhole plates were last taken off, or indeed thrown down in one corner so dark and unexplored that the tools never see the light of day again. Let us have order and regularity, and our predictions of disaster will rarely, if ever, be verified.

MUSK-RAT HOUSES.—It is generally believed by "old trappers," who ought to know more about it than any body else, that the formation, strength and hight of the musk-rat houses is a sure precursor of high or low water during the spring succeeding their construction. Now, if there is any truth in this, then we may expect a raging high flood next spring, for it is a fact that the average hight of the musk-rat houses is at least two feet higher than for several years past. We leave the subject for naturalists to investigate.—*St. Paul Union.*

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NEW EXPERIMENTS WITH GUNS AND TARGETS.

Another set of experiments with flat-headed solid bolts and flat-fronted shells took place place at Shoeburyness, England, on the 14th ult., and elaborate accounts of the trials are given in the London *Times* and several other journals. In this case the trial was with a stronger target than had ever before been used, and at a greater range. Again the guns and projectiles came off victorious. The target was 10 feet high and 15 feet in breadth; the upper plates were 4½ inches thick, the lower ones 5 inches, and the backing was composed of 18 inches of teak wood, and an inner skin plate ⅝th of an inch thick. The top and sides of the target were inclosed like a box to resemble the between-decks of a ship. A 70 pounder gun was placed at a distance of 600 yards and a 120-pounder at 800 yards. The latter gun was first fired with a Whitworth shell and a charge of 27 lbs. of powder. The projectile weighed 151 lbs., and was filled with 5 lbs. of powder. It left the muzzle of the gun with a velocity of 1,500 feet per second, and it struck the center of the 5-inch plate when its speed was 1,220 feet per second. This shell passed through the target and burst inside. The hole made was a clean cut, 8 inches in diameter; but the burst ing of the shell did comparatively little damage beyond that of a solid shot. The second shot fired was similar to the first, and with like results. These bolts were made of steel. A third shot was then fired with a flat-fronted cast-iron shell which weighed 130 lbs. This shot, when it struck the target broke into fragments and only made an indentation two inches deep. The last shot fired was with a solid steel shot which weighed 130 lbs.; it also went through the target.

The trial then took place with the 70-pounder at 600 yards distance. It was fired with a steel shell which weighed 81 lbs., and a charge of 13 lbs., of powder. The shell struck the 4½-inch plate, passed through the wood to the inner plate and burst. Two other similar shots were fired with like results.

These experiments have proved that solid iron plates of five inches in thickness, backed with 18 inches of wood, and a plate of ⅝ths of an inch thick (making a total of nearly six inches of iron and 18 of wood), can be pierced with ease at great distances by steel shells. And on the other hand they have demonstrated that cast-iron projectiles are almost useless in firing against such thick plates. The guns were rifled, and, with the projectiles, were furnished by Mr. Joseph Whitworth. The rifling was octagonal in the large gun and hexagonal in the smaller.

As a bit of advice to our Secretary of the Navy, who has advocated so strongly the organization of national workshops, on the plea that private establishments cannot furnish such good materials and workmanship, we would state that the British dockyard shops have always failed to make reliable plates—the best have been furnished by private establishments.

THE DRAIN OF LABOR.

From all parts of the country we hear continued complaints of the scarcity of labor, not only from the farmers, but also from the manufacturers and merchants. In some of the western States, if we may credit our exchanges, the cost of reaping the crops has been greatly increased by the delay which has occurred in getting the grain to market; as also by the higher rates it has been found necessary to pay for "help." The reason for this stringency is apparent; the reapers of the fields toil now in other scenes. Steel, no longer harmless but deadly, is wielded by their sturdy arms; the saw, the hammer, nay even the pen, lies idle and useless while the graver and more weighty matters of "life, liberty and the pursuit of happiness" claim the attention of the nation.

In our own city it has been frequently said by parties, within our own hearing, that their business was suffering for want of hands, and from this office may be seen every day full regiments of the rank and file, the bone and sinew of the various trades and handicrafts, marching away to the seat of war. It is a nice question and a vexatious one, to decide how far the absence of portions of a trade will affect the standard of wages of those who remain. We should be ignorant of passing events if we were blind to the fact that strikes in the several trades are daily taking place, with more or less success, according to the nature of their demands. We are not of that school of philosophers who think fine spun theories necessary to decide upon the relations of labor and capital. A fair day's work for a fair day's wages should be the standard, and then let individual skill and excellence determine the rate of remuneration in solitary cases. It has been our fortune to mingle with mechanics to some extent, and we have invariably found this sentiment to be the prevailing one among the most intelligent and reflecting of them. Societies of whatsoever nature fall very far short of exercising any material good upon the general welfare of those trades which they profess to serve—at least such has been their history in this country.

We have seen many a promising institution arise, based upon the assumed necessities of employers and their compulsory compliance with certain fixed rules of wages, and we have seen the same fade and fall through want of unanimity and proper organization. So soon as the leaders of these societies had secured their own particular advancement, the lesser lights in the company were left to their own devices; then bickerings and disputes very soon demolished whatever remained of the brotherhood. Far be it from us, in discussing these questions, to assume any tone that might be mistaken for levity. The right to ask for increased wages is undeniably and manifestly correct, but the right to grant any such advance rests solely with the employer and his needs. This has been our ground always, and we maintain as a principle that no man should be discharged or degraded in rank because, like Oliver Twist, he dares to ask for more.

Strikes, though apparently beneficial, are in no wise so; they are at best but a specious remedy for an assumed disease that lies far beyond their reach. There can be no general system of fixed wages in any community, for every man, in most cases, will earn just such sums as his skill entitles him to; that there are exceptions to this rule we readily acknowledge, but as to the main part of our statement the facts remain incontrovertible. Another feature of these revolts against natural laws, is the reaction that takes place immediately after the *furore* and excitement of their inauguration; those who have been instrumental in starting them, and who were the first to receive the advance, are quietly set aside and their places supplied with other men at the earliest moment. Only by mutual co operation can a proper state of feeling exist between the employer and the employed. Conflicting interests produce jarring and derangement where only concord should exist; and we can say, feelingly and truthfully, that any trade which loses sight of the fundamental principles upon which the value of labor is based, not only inflicts a temporary injury upon its members but a future and permanent one, which results in depreciating its *morale* to such an extent that it sinks very low in the public estimation. Very generally, however, the requests of the workmen have been met, as all employers have seen that the advance demanded was by the nature of things not improper.

We invite our readers to notice the large amount of original matter contained in this number. Our editorial staff is strong, and we never labored harder to make our columns acceptable and profitable to our generous patrons. We are determined as the difficulties increase in respect to the enormous rise in paper, to work all the harder to make the Scientific American more acceptable and valuable to its readers. All we want is your steady patronage, and we will do our part to the best of our ability.

A Good Day's Work.—We determined to act out our advice given in another article to "bring on the paper stock;" consequently we spent one day in scouring every nook and corner of our office for the precious material. The result astonished us. We had an accumulation of 3,500 lbs. of useless material, which we readily sold at nine cents per pound, which netted a handsome remuneration for our day's work.

Raising Sunken Ships-of-War.—The ship-of-the-line, *United States*, sunk in Norfolk navy yard when that place was evacuated by our forces, has been raised; and men are now at work on the *Cumberland*, which was sunk by the *Merrimac*.

RECENT FOREIGN INVENTIONS.

New Cement.—A patent has been taken out by H. D. Scott, of Chatham, England, for the manufacture of a new composition called "Scott's cement," the specification of which we condense from *Newton's London Journal of Arts*. Quick-lime in the state of powder is submitted to the action of sulphurous acid gas. The slacked lime is passed through a revolving screen which sifts it, then it is carried down a shaft lined with fire-brick, which shaft is heated by a fire outside. The heated lime, in a thin shower, is here met by a stream of heated sulphurous acid gas and is impregnated with it. The gas is prepared by placing sulphur in an iron vessel, having a fire underneath it; and as the sulphur burns, the gas is given off in large quantities. One pound of sulphur to 80 pounds of lime is required. Iron pyrites may be used in place of pure sulphur. The sulphurous gas is also conducted to mingle with the flames of a furnace before it mixes with the lime, so as to combine with a considerable quantity of oxygen. The lime thus impregnated with the sulphurous acid gas is now cooled and is fit for use as a cement. In nature this cement is similar to roasted plaster-of-paris, and may be used for like purposes.

Artificial Molder's Sand.—Melted pig metal from blast furnaces is usually run into molds of natural sand. A patent has been obtained by John Gjers, of Middleborough, England, for the production of an artificial material which he states is superior to the natural sand. It consists of the slag of blast furnaces, which when in a molten state, is run into a vessel containing water, wherein, by sudden cooling, it becomes divided into minute particles. These are then passed between heavy rollers and crushed, and in this condition used for molding. When employed for making "pig beds" instead of natural sand, the pigs come out of the molds much cleaner. On the outside of iron pigs run into ordinary sand beds, there is always a coating of silica. This requires the employment of lime or oyster shells in the cupola furnace, as a flux when the pigs are smelted for castings. The employment of this artificial sand obviates the use of lime in the cupola furnace. This material reduced to a fine state, when mixed with molding sand in foundries, renders it superior in the production of smooth castings,

Hardening and Tempering Steel Wire.—R. Hadfield and J. Shipman, of Sheffield, have secured a patent for hardening and tempering steel wire to be used for crinoline and other purposes. The furnace for heating the wire is constructed with fire-clay slabs, having channels through which the wire is drawn upon a reel. In close proximity to the end of the furnace is placed a trough containing a composition, consisting of about one pound of tallow and one pound of resin to every gallon of oil. This is the hardening composition, and a stream of cold water flows constantly through the water trough to keep the hardening composition cool. The wire is drawn through the resin and oil composition, and passes through chips of leather to remove the surplus oil. The wire being thus hardened is carried along continuously under a roller, thence through a tempering bath of molten lead, then through a considerable space exposed to the atmosphere to cool it before it is finally wound upon the reel. The speed of the reels for drawing the wire is proportioned to the time requisite for heating, hardening, tempering and cooling, according to the thickness of the wire operated upon.

Paper from Hay and Beet Root.—A patent has been obtained by J. H. Johnson. of London, for making paper from sea wrack (zostera marina), the residuum of the beet-root and common hay. These substances, in about equal proportions, are first immersed in a lime bath for about 24 hours, and are thereby reduced to a coarse pulp. They are then boiled in a boiler for about 12 hours in a solution of caustic soda, under a pressure of 60 pounds on the square inch, and when taken out are washed in water, then treated with carbazotic acid, and afterward bleached with chloride of lime and sulphuric acid, in the same manner that rag pulp is bleached. The subsequent processes are also similar to those which common pulp undergoes.

Tea to the value of $7,500,000 is annually imported into Russia. A person taking tea once a day will consume about 7½ lbs. in a year.

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RECENT AMERICAN INVENTIONS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list.

Revolving Fire-arms.—This invention relates to that class of revolving fire-arms in which the bores of the chambers are continued right through the cylinder for loading them at the breech with metallic cartridges. It consists in so constructing a slide for closing the opening provided in the recoil shield for the insertion of the cartridges into the chambers, and so applying the same in combination with the pawl by which the rotary motion of the cylinder is produced, that the said slide prevents the acts of cocking the hammer or rotating the cylinder, while it is open, and that the hammer, when cocked, prevents the said slide from being opened. James Jenkinson, of Brooklyn, N. Y., is the inventor of this improvement.

Device for Indicating the Elevation of Ordnance.—This invention consists in combining a sighting bar with a device for indicating the elevation of the piece, on the same side of the gun as the latter device, so that the sighting of the gun and the adjustment of the elevation may be directed by the same man and at the same time. Charles B. Long, of Worcester, Mass., is the inventor of this device.

Officers' Shoulder Straps.—The object of this invention is to obtain a shoulder strap which is less costly and more durable than those which are made of bullion embroidery, and which has a better appearance than those in which the border and bars are composed of metal plate, and, at the same time, it has a desirable degree of flexibility; to this end it consists in the construction of the border of the shoulder strap of wire by coiling the wire upon a mandrel of half-round or nearly half-round shape to form the sides and ends of the border, and combining the sides and ends by means of internal corner pieces stamped or otherwise formed of plate metal. It also consists in the use of a lining of wire cloth applied in combination with the coiled wire of the border for the purpose of better preserving the form of the border and keeping the coiled wires from separating perceptibly in case of the bending of the strap. Gideon Robinson, of New York city, is the patentee of this invention.

Drip Pots for Refining Sugar.—The drip pots commonly employed for the draining of the molds in the manufacture of sugar are made with cast-iron bottoms of uniform thickness, and in placing away the pots one above another in the sugar-house the bottoms are often cracked or broken by being brought down violently upon the edges of the necks of those upon which they are placed. The object of this invention is to prevent such fracture, and to this end it consists in strengthening the bottoms by casting them with ribs projecting in such a manner that, in setting down the pots on the tops of others, the ribs, where the greatest strength is, will always strike the necks of the pots below them. Alexander Mackey and John W. Jarboe, of New York city, are the inventors of this improvement.

Machine for Dressing Fibers.—This invention relates to the employment, in combination with each other and with suitable feeding rollers, of a series of combs or combs and scrapers attached to the periphery of a cylinder and a similar series attached to an endless belt, for the removal of the woody or pulpy portions of the leaves from the fiber. It consists in so arranging the bearings of the shaft of the drums which carry the endless band, and those of the feed rollers as to leave the machine open on one side to facilitate the removal of the fibers; and it further consists in so applying the upper feed roller as to allow the end next the open side of the machine to be raised for the purpose of permitting the uncombed ends of the leaves to be taken out of the machine. J. A. de Brame, of New York city, is the inventor of this improvement.

Improved Harrow.—This invention consists in the arrangement of two or more rows of flanged teeth rounded at their front edges and secured to the frame in oblique positions, one row being inclined to the right and the other to the left, and so disposed that they cover the whole line, in combination with longitudinal triangular ribs attached to the same frame with the teeth in such a manner that by the action of the teeth, when the harrow is drawn over the field, every particle of ground is disturbed and pushed off first in one direction and then in the other; and by the action of the triangular ribs the ground is fully smoothed, pulverized and leveled. C. E. Steller, of Genesee, Wis., is the inventor of this improvement.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING DECEMBER 2, 1862.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publisher of the SCIENTIFIC AMERICAN, New York.

37,030.—W. D. Andrews, of New York City, for an Improvement in Steam Engines:

I claim the construction of the valve with flanches, l l, attached respectively to the partitions, k k, and arranged to operate in conjunction with the ports, all in the manner herein shown and described.

[This invention relates to valves of that class which effect the reversal of the engine by reversing the relation of the steam and exhaust pipes with two chambers or passages, or sets of passages in the steam chest of the engine. It consists in a certain construction of such valve of ring form, and a certain arrangement of the ports and passages or pipe connections in its casing, whereby the said valve and casing are enabled to be fitted up entirely in a turning lathe, and the valve when in use is perfectly balanced.]

37,031.—G. B. Bailey, of Greenfield, Ind., for an Improvement in Grain-cleaners:

I claim the curved guard plate arranged over the space, a, in cylinder, A, as herein set forth for the purpose specified.

[This invention consists in constructing a cylindrical screen with a longitudinal opening in it, which is protected by a curved plate, arranged in such a manner over said opening that grain may be readily put into the cylinder, and the cylinder rotated in one direction without the grain escaping, and by rotating the cylinder in an opposite direction the grain will all escape through the guard opening.]

37,032.—R. Chester, of Chicago, Ill., for an Improvement in Signal Lanterns:

I claim the combination and arrangement of the glasses, c d e, (whether set in frames or not) the grooves, C D E, and the cords, r r′ g g′, and second, the arrangement of the wings, a, with the glass, c, all constructed and operating substantially as and for the purposes delineated and set forth.

37,033.—C. O. Crosby and Henry Kellogg, of Hartford, Conn., for an Improvement in Machines for Frilling and Crimping:

We claim, first, A crimper, acting substantially as described, to crimp goods and to space the crimps, in combination with a table or platform and a holding mechanism or holder, substantially such as described, the combination acting substantially as specified, and we claim these also in combination with either one or two mechanisms for making stitches, substantially as specified.

Second, We claim in combination, a crimper and a smoother, substantially such as described, and acting substantially as specified to fold the crimps to an edge.

Third, We claim a crimper, whose acting edge is provided with slots, substantially as described, to admit the passage of a needle to secure the crimps as formed while said crimps are being held by the crimper.

Fourth, We claim in combination with a crimper, substantially such as specified, a spring acting to force said crimper upon the goods while crimping them, and relaxing its pressure while the crimper is retreating, substantially in the manner and for the purpose specified, and, lastly, we claim an auxilliary smoother, having a mode of operation substantially such as specified in combination with a crimper and a holder or holding mechanism, substantially such as described.

37,034.—D. M. Cummings, of Enfield, N. H., for an Improvement in Water Wheels:

I claim the long and short sided buckets, A A A, of my improved water wheel, made substantially as herein described.

I also claim the use of a combined series of long and short sided acute-angled buckets, A A, when arranged within a water way, E, which is furnished with a series of stationary tangential shutes, K K, and with a connected series of movable connecting gates, M M, substantially in the manner and for the purpose herein set forth.

I also claim the arc-shaped open spaces, t t t, which immediately surround my improved water wheel, the said spaces being outwardly bounded by the tangential chutes, K K, and the inner side of the water-way, E, substantially in the manner and for the purpose herein set forth.

37,035.—H. H. Day, of New York City, for an Improvement in Elastic Breeches for Ordnance:

I claim an elastic breech-piece, composed of rubber or its equivalent, acting in combination with confined air, the whole being placed in rear of the charge, constructed substantially as above set forth, for the purpose of lessening the pressure upon that part of the gun against which the gases press with greatest force in the act of explosion.

[An engraving of this invention will soon be published in our columns.]

37,036.—O. H. Dunham, of Washington, D. C., for an Improved Lubricator for Steam Engines:

I claim the combination of the simultaneously-operating disk valves, B F, with the tubes, a2 e2 and f2, arranged to provide independent and unobstructed passages for the oil and steam, in manner substantially as and for the purposes explained.

[This invention consists in a certain novel arrangement of two connected disk valves operating simultaneously with separate ports, whereby the steam or air from the part of the engine to be lubricated is conducted through the oil without interfering with its descent.]

37,037.—John Firth and John Ingham, of Phillipsburg, N. J., for an Improved Flask for Cast-iron Pipes:

I claim, first, The combination substantially as set forth of the two halves, A and A′, of the flask hinged together, the staples, I, or their equivalents, the flanges, a a, and clamps, B B, or their equivalents, for the purpose specified.

Second, The covers, H, of the holes, G, when the said covers are hung to the side of the flask and adapted to projections on the same, in the manner described.

37,038.—F. W. Hudson, of Leominster, Mass., for an Improvement in Apple-parers:

I claim the arrangement of the gearing, E g h, disk, E, and shaft, C, substantially as shown, for giving the fork, I, and apple thereon the two movements specified; in combination with the knife arm, J, arranged to operate conjointly with the aforesaid parts through the medium of the pinion, G, lever M, and flange, l, on disk, F, or their equivalents, substantially as herein described.

[This invention consists in arranging the fork on which the apple is placed with gearing, in such a manner that it will by the turning of a crank rotate on its axis, and also rotate in a circle in such relation with a knife or cutter that the apple will be properly pared; the knife being so arranged as to operate conjointly with the fork to effect that result.]

37,039.—D. M. Gunn and C. L. Cain, of Oskaloosa, Iowa, for an Improvement in Beehives:

I claim, first, The springs or elastic projections, C, attached to the comb frames, B, as and for the purpose herein shown and described.

Second, The false or sliding bottom, F, provided with a cleat, j, all around its edge, and an alighting board, n, and also provided with recesses, l, in its under surface in connection with the notches, m, in the under side of the bottom, and in the lower edges of the sides of the bottom of the hive, substantially as and for the purpose herein set forth.

[This invention relates, first, to an improvement in the construction of the comb-frames of the hive, whereby the bees are allowed a free passage from one comb-frame to the other, and the former rendered less liable than hitherto to join the combs of contiguous frames, and the guard wires between the upper parts of the frames allowed to be placed lower in position than formerly, so as to prevent them being waxed or glued to the cover of the hive. The invention also relates to an improved means for keeping the comb-frames at a proper distance apart, and also to a novel and improved arrangement of a false bottom applied to the hive in such a manner that the advantage of a proper ventilation is obtained, as well as facilities for cleaning the hive, and the guarding of the same against the ravages of the bee moth.]

37,040.—Suspended.

37,041.—Joseph Goodrich, of Muscoda, Wis., for an Improvement in Sorghum Strippers:

I claim the cutter, A, when constructed, arranged and operatin substantially as and for the purposes delineated and set forth.

37,042.—Richards Kingsland, of New York City, for an Improvement in Heaters and Ventilators for Tents:

I claim the combination of the stoves, A B, drum, F, ventilating pipe, H, and discharge pipe, G, constructed and arranged to operate n manner substantially as and for the purpose set forth.

[This invention is formed of two of Kingsland's army stoves, together with a long drum and ventilating pipe. The entire apparatus is nested together within a single stove. It has been fully tested, and has received high commendation from the principal authorities in the army.]

37,043.—Richards Kingsland, of New York City, for an Improvement in Army Stoves:

I claim, first, A course of two or more stoves, A B, each having the form of an elliptical cylinder with a flat upper surface, and provided with movable legs, b, a movable head, d g, and tapering pipe, i, all as herein described, so as to adapt them to fit compactly one within another, in the manner and for the purposes explained.

Second, Securing the pipe, i, and movable head in position by means of the prong, h, and loop, j, in manner substantially as and for the purposes explained.

[The object of this invention is to produce a portable and effective stove particularly for army purposes, capable of being transported with ease and facility, and of being readily put up and used with a comparatively small quantity of fuel.]

37,044.—Henry Kurth, of New Lotts, N. Y., for an Improvement in Tobacco Pipes:

I claim the arrangement of the central opening, c, and weighted valve, d, in combination with the perforated plate, C, inserted into the bowl, A, of a smoking pipe, substantially in the manner and for the purpose shown and described.

[The invention consists in the arrangement of a weighted valve being retained by a perforated plate which is inserted in the bowl above its junction with the stem, in such a manner that the inner end of the smoke channel is never closed by the tobacco in the bowl, and consequently a good draught of the pipe is insured, and that by means of the central valve the spittle and other impurities accumulating in the lower portion of the bowl can easily be removed without taking out the perforated plate.]

37,045.—J. H. Mabbett, of Mechanicsville, N. Y., for an Improvement in Railroad Chairs:

First, I claim a railroad chair having a recess or opening, E, through the bottom plate or bed thereof, with lip, D, upon the inside, and the lip, B, on the opposite side thereof, and each next adjoining the said recess or opening, E, on opposite sides of the same, in combination with the block, P, substantially as herein described and set forth.

Second, I also claim supporting the head or table of railroad rails at their respective joints on the outside thereof, and immediately under and adjoining the same, by means of the brace, B, in combination with the bottom plate or bed of the chair, and with the head or table of such rails, whereby great strength is given thereto, and undue wear and fracture thereof prevented, substantially as herein described and set forth.

37,046.—Alexander Mackey and J. W. Jarboë, of New York City, for an Improvement in Drip Pots for Refining Sugar:

We claim the construction of a drip pot with a ribbed bottom, substantially as and for the purpose herein specified.

37,047.—J. J. Marcy, of Meriden, Conn., for an Improvement in Lamp Burners:

I claim the burner, B, having its tube, c, perforated at its lower end and encompassed by the guard or flanch, f, in combination with the perforated annular flanch or chimney supporter, C, applied to the tube, c, below the deflector or cone, d, all arranged as and for the purpose herein set forth.

[The object of this invention is to obtain a lamp for burning coal oi with or without a glass chimney, and it consists in a peculiar arrangement of two perforated rims, a draught chamber and a cone or deflector, whereby the flame of the lamp will be supplied with a requisite quantity of air to support proper combustion, and the draught of air rendered uniform, so that the flame will not flicker, but give a steady light.]

36,048.—I. M. Milbank, of Greenfield Hill, Conn., for an Improvement in Breech-loading Fire-arms:

I claim the employment of a detached or loose breech-piece, C, and a self-locking independent breech-wedge, D, arranged to operate together in the manner herein shown and described.

[This invention relates to the use of a chambered breech, which fits to the rear of the barrel with a valve-like joint, and which has a movement toward and from the barrel, in a direction parallel therewith, and a tilting movement to bring its muzzle above the barrel for loading. It consists in a certain improved arrangement of such a breech in the frame of the gun and means of locking the same in connection with the barrel for firing, and unlocking the same preparatory to loading, whereby a breech-loading firearm of exceedingly simple construction, and which is very durable and effective, is obtained.]

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37,049.—Lewis and Jacob Miller, of Canton, Ohio, for an Improvement in Harvesting Machines:

First, We claim in combination with a reversible main frame and cutting apparatus, the double pawls and ratchets for connecting and disconnecting the driving wheels and axle, so that the necessary fast and loose motions of the wheels upon their axles may be had, whichever end of the main frame goes foremost, substantially as described.

We also claim, in combination with a hinged platform or cutting apparatus, the locating of the raker's position on the coupling bar, which connects said platform or cutting apparatus with the main frame, substantially as described.

We also claim, in combination with a hinged platform, finger bar and cutting apparatus, a double-hinged side or fence on said platform, so that the finger bar, cutters and platform attached to them, may be folded up to or against the main frame, so as to be carried by the main frame, substantially as described.

37,050.—W. T. Nichols, of Rutland, Vt., for an Improvement in Motive Power:

I claim a treadle or rocker, E, constructed, arranged and operated substantially in the manner and for the purpose set forth.

37,051.—J. D. Otstot, of Springfield, Ohio, for an Improvement in Lifting Jacks:

I claim, first, So connecting and combining the lever, B, with the stock and lifting bar that it may be attached or detached, for use or for transportation at a moment's notice, in the manner herein set forth.

Second, The employment of the rod, d, in connection with the pawls, a a, for the purpose of detaching them from the teeth of the rack bar, when necessary, substantially as specified.

Third, The arrangement of the lever, B, the pawls, a a, the springs, c c, the rod, d, and the lifting bar, E, in the manner and for the purpose specified.

37,052.—C. H. Palmer, of Lakeville, Conn., for an Improvement in Repeating Guns:

I claim, first, Presenting and thrusting the cartridges into the rear of the revolving barrel or series of such barrels in one point in its circuit, confining and discharging them at another point in such circuit, and removing the shells or cases in another part of such circuit, in the manner substantially as set forth.

Second, The employment in such machines of the projections, g, and surface, i, arranged relatively to the breeches of the barrels, G, and to the surface, I, or their respective equivalents, in the manner set forth, and this I claim whether the breeches of the barrels and the projections, g, or either of them, be adjustable or permanently fixed.

Third, The employment in breech-loading arms, of the movable spout, N, turning on a hollow axis in line with the barrel to be charged, for the purpose herein set forth.

Fourth, The arrangement of the movable spout, N, springs, P and N2, and pusher, Q3, as herein set forth.

Fifth, The spring guides, N1, arranged in an annular series around the path of the pusher, Q3, for the purpose set forth.

Sixth, The clearing hooks, t t, arranged and operating as described, in connection with the revolving barrels, G, or their equivalents.

Seventh, The clearing lever, U, operated by the reciprocation of the clearing hooks, t t, and combined and arranged therewith, substantially as herein set forth.

37,053.—J. G. Perry, of South Kingston, R. I., for an Improved Meat-cutter:

I claim, first, The combination of the two spiral-flanged cylinders, differing from each other in the number of flanges and in the speed at which they are driven, substantially as herein described and for the purposes set forth.

Second, I claim the cross knives, S, in combination with the case and cylinders, substantially as described and for the purpose set forth.

37,054.—Titus Powers, of Philadelphia, Pa., for an Improvement in Rifling Machines:

I claim, first, The combination of the vibrating pinion shaft, I, and pinion, H, with the reciprocating frame, E, and plunger, D, all constructed and arranged, substantially as set forth.

Second, Causing the reciprocating frame, or any devices connected therewith, to impart an intermittent motion to the plunger, D, or tube, C, through the intervention of a bell-crank lever, G, and hub, F, with arms, y, substantially as specified.

37,055.—T. H. Risdon, of Mount Holly, N. J., for an Improvement in Casting Water Wheels:

I claim casting water wheels in one piece, in the manner and by means of a mold or molds, constructed and arranged as described.

[This invention consists in casting all the parts comprising the wheel in one piece, by forming, by means of a suitable mold, cores for the buckets—or, rather, for the spaces between the buckets—and setting them up in the mold.]

37,056.—Gideon Robinson, of New York City, for an Improvement in Shoulder Straps:

I claim a shoulder strap having its border composed principally of a series of wires, b b, coiled or wound in a half round form, and a series of internal corner pieces, C C, combined substantially as herein specified.

37,057.—Christian Sharps, of Philadelphia, Pa., for an Improvement in Rifling Machines:

I claim, first, Imparting to the cutting rod of a rifling machine, a reciprocating motion, through the medium of an endless belt or chain, or their equivalents, and a rod connected thereto, substantially as and for the purpose herein set forth.

Second, I claim any convenient number of projections, x, on the rod, E, in combination with the grooved cylinder, D, when each projection is caused to pass from one groove of the cylinder to the adjacent groove, by the automatic devices herein described.

Third, I claim in combination with the rod, E, of a rifling machine, the hub, F, with its reversed inclined planes, m and n, the spring, I, and its projection, i, the whole being arranged and operating substantially as and for the purpose herein set forth.

37,058.—Abiel Sampson, of Providence, R. I., for an Improvement in Putting up Cranberries for Preservation:

I claim the merchantable package of cranberries, preserved in their natural condition by being submerged in water, as a new manufacture or article of trade.

37,059.—Jacob Rupertus, of Philadelphia, Pa., for an Improvement in Revolving Fire-arms:

First, I claim the center pin, C, having one end secured to the barrel and the other end formed substantially as described, so as to fit to the frame, the pin thereby serving as a longitudinal stay to stiffen the said frame, as described.

Second, The arm, I, hung to the frame and adapted to the end of the center pin, substantially as described.

37,060.—J. M. Simpson, of Maultville, N. Y., for an Improved Machine for Cutting Tenons on Wheel Spokes:

I claim, first, The cutter bars, E E, placed in the reciprocating frame, B, and used in connection with the adjustable keys or wedges, j j s s, all arranged substantially as and for the purpose set forth.

Second, The adjustable bed, H, provided with the gage, M, guide, J, and clamp, K, when said bed is used in connection with the cutter bars, E E, and reciprocating frame, B, and arranged therewith, as and for the purpose specified.

Third, The combination of the cutter bars, E E, reciprocating frame, B, and adjustable bed, H, all arranged for joint operation as and for the purpose set forth.

37,061.—C. E. Steller, of Genesee, Wis., for an Improvement in Harrows:

I claim the arrangement of two or more rows of teeth, C D, secured by means of flanges, c d, and screws, a, or their equivalents, in oblique positions to the frame, A, in combination with the triangular bars or ribs, E, on the rear part of the frame, A, all constructed and operating in the manner and for the purpose specified.

37,062.—W. H. Thompson, of Cleveland, Ohio, for an Improvement in Horse-shoe Machines:

I claim, first, The adjustable rest, Q1, gage, S, slide, U, and fingers, b b, in combination with the cylinder, E, and sliding mandrels, J J'.

Second, The combination of the cylinder, E, the mandrels, J J', with their radial stems, M M', and arms, N N', and the cams, O O', constructed and arranged substantially as set forth.

Third, The combination of the cylinder, E, the sliding jaws, G G G' G', cams, I I, and pin, K, operating in conjunction with the wheel, D, and male dies, F F', the whole constructed and arranged substantially as specified.

37,063.—John Tremper, of Buffalo, N. Y., for an Improvement in Variable Cut-off Gear for Steam Engines:

I claim, first, The attachment of the lifters or tripping levers, F F', by pivot joints to two arms, E E', which are so arranged upon a rock-shaft, or its equivalent, as to work below the axis thereof and so cause the opening of the valve, slowly at first and with a gradually increasing velocity, substantially as and for the purpose herein specified.

Second, The combination of the lifters or tripping levers, F F', applied as above specified, the lifting block, B, and the cone, G, substantially as and for the purpose herein set forth.

Third, The arrangement of the lifters or tripping levers, F F' and the toothed lifting block, B, in combination with the rock-shaft, D, and a cone, G, connected with the governor or otherwise controlled, substantially as herein specified.

Fourth, The mechanism shown in Figs. 3, 4 and 5 and herein described, for tripping the levers, F F', in their downward motion, substantially as and for the purpose herein set forth.

[This invention consists in a certain novel mechanism, composed of two toothed lifters or tripping levers, jointed to two arms of a rock-shaft, and operating in combination with a toothed block on the upright stem or rod of the cut-off valve, and with a cone or wedge connected with a governor or otherwise made adjustable, whereby a gradual opening of the cut-off valve for the admission of steam to the engine cylinder, and a sudden closing of the same to cut off the steam at such point as may be required during the first half of the stroke of the piston, are obtained; and it also consists in certain means applied in combination with the aforesaid tripping levers, for the purpose of enabling the steam to be continued on the piston to different points beyond half-stroke.]

37,064.—John Tremper, of Buffalo, N. Y., for an Improvement in Centrifugal Governors:

I claim, first, A steam governor having vertical or nearly vertical ball arms, b b, and arms, c c, horizontal or otherwise, acting upon a valve-controlling or valve-actuating rod, d, the arms, c c, being as long as or longer than the arms, b b, and the whole so constructed and arranged as to avail the full centrifugal force of the balls when hanging in vertical or nearly vertical positions and impart to the rod, d, a motion at least equal in extent to that of the balls.

Second, The rectangular or nearly rectangular ball arms, b c, b c, and the loaded lever, G, applied in combination with each other and in relation to the governor spindle and valve-operating or valve-controlling rod, d, substantially as herein specified.

Third, So constructing the connections or surfaces of contact of the ball arms, the valve-operating or valve-controlling rod and the loaded lever, that the effective load on the lever acting in opposition to the centrifugal force of the balls, increases or diminishes as the centrifugal force of the balls increases or diminishes, substantially as herein described.

[The object of this invention is so to construct a centrifugal governor that it may be driven at any speed, and increase or obtain power according to the speed, in such a ratio as to overcome friction; also to enable the balls to be made small and effect the necessary movement of the valve by a very little motion toward and from the axis of revolution; also to cause the governor to run at the same speed whatever the position of the balls relative to the axis; and to these ends the invention consists in a certain novel mode of applying the balls in combination with the spindle or axis of the governor, and with a weight or spring employed to act in opposition to the centrifugal force of the balls.]

37,065.—W. H. Willard, of Cleveland, Ohio, for an Improved Revolving Extension Colter and Gage Wheel Combined:

I claim a gage wheel and revolving extension colter, constructed and operating substantially as and for the purpose specified.

37,066.—W. A. Wood, of Hoosick Falls, N. Y., for an Improvement in Cutting Apparatus for Harvesters:

I claim the harp or bow-shaped guard surrounding the finger bar, and leaving the unobstructed space herein represented between itself and the finger bar, substantially as and for the purpose described.

37,067.—Wm. R. Arthur (assignor to himself and L. H. Clarke), of Chicago, Ill., for an Improvement in Railroad Splices:

I claim a splice or fastening for T-rails consisting of the pair of deeply-crimped fish plates, B a b c B' a b c, secured by bolts or keys, C C', passing through the upper part of the fish plates and through the neck of each rail, and by one or more bolts or keys, C'' C''', passing through the lower parts of the fish plates beneath the rails, when the said plates are adapted to fit the T-rails in the manner specified, that is to say, wedging tightly between the base and tread of the rails, grasping the base above and below, and covering the under side of the latter for the greater part of its width, all as herein shown and described, so as to support the head and base of the rails against both vertical and lateral deflection without strain upon the bolts.

37,068.—E. C. Blakeslee (assignor to Holmes, Booth & Hayden), of Waterbury, Conn., for an Improvement in Lamps:

I claim the bent lever, g, on the fulcrum, l, and actuated by a spring, as set forth, in combination with the flanged chimney, c, and ring or holder, b, for the purposes and as specified.

37,069.—P. L. Clow (assignor to himself and Windsor Stone), of Cohoes, N. Y., for an Improvement in Sash Fastenings:

I claim the latch, C, the catch, b, and the spring, e e, the whole constructed, arranged and operating in the manner and for the purposes set forth.

37,070.—James Crawford (assignor to himself and W. H. McIntosh), of Roxbury, Mass., for an Improved Flower Stand:

I claim the flower stand herein described and represented, consisting of shelves, c, brackets, B, standard, A, and pedestal, a, combined, arranged and operating in the manner and for the purpose set forth.

[The object of this invention is to produce a flower stand capable of supporting and exhibiting at one view a large number of flowers growing in pots, and which admits of the same being arranged in a variety of ways to form a mammoth bouquet or variegated flower-tree; and it consists in the manner of arranging a series of shelves on a standard so that they can be placed in any desired position thereon horizontally, each independent of the other and made self-sustaining.]

37,071.—George Custer (assignor to himself, E. B. Root and J. J. Stevens, of Monroe, Mich.), for an Improved Cultivator Tooth:

I claim, as an improved article of manufacture, a cultivator tooth provided with wings, and all constructed of a piece of rolled steel, in the manner herein set forth.

[This invention consists in constructing a cultivator tooth of rolled steel with a wing at each side, both formed from the same piece, whereby a much superior tooth than usual is obtained, one that will run steadier in the soil and pulverize the earth more perfectly.]

37,072.—Thomas Hope, of Boston, Mass., assignor to himself and Henry Edgarton, of Shirley, Mass., for an Improvement in Skates:

I claim the actuator, consisting of the right and left screw and lantern, when used in combination with the sliding heel rest, C, the stationary foot rest, b, loop, B, and heel and instep straps, D and E.

37,073.—Stephen Hull (assignor to himself and Isaac W. White), of Poughkeepsie, N. Y., for Improvement in Harvesters:

I claim constructing the guard fingers, A, with four planes, d n i j, or the equivalent thereof, substantially as and for the purposes set forth.

37,074.—R. G. Hunt, of New York City, for an Improvement in Wooden Sieves for Gas Purifiers:

I claim a sieve or section of a sieve made from the solid wood by slotting, when the slots are conical in form and so formed at the end as to leave a wider bar at the end on the bottom side, substantially as described and substantially for the purpose hereinbefore set forth.

37,075.—James Jenkinson, of Brooklyn, N. Y., assignor to Joseph Merwin and E. P. Bray, of New York City, for an Improvement in Revolving Fire-arms:

I claim the slide, F, so constructed with a slot, e, and notch, f, or their equivalents, and so combined with a pawl, a, through which the roation of the cylinder is effected, that the cocking of the hammer and rotation of the cylinder are prevented while the slide is open and that the pawl prevents the slide from being opened while the hammer is being cocked substantially as herein specified.

37,076.—C. B. Long (assignor to himself, Augustus Rice and Jonathan Luther), of Worcester, Mass., for an Improvement in Adjustable Sights for Ordnance:

I claim combining the sighting bar and the device for indicating the elevation on the same side of the piece, substantially as and for the purpose herein specified.

37,077.—G. H. Reynolds (assignor to himself and C. H. Delamater), of New York City, for an Improvement in Condensing Steam Engines:

I claim, first, The so-combining and arranging the air-pump bucket relatively to the steam piston that the latter shall, by the pressure upon the former be caused to come to or near the condition of half-stroke, substantially in the manner and for the purpose herein set forth.

Second, Operating the pressure cock, Q, or its equivalent, by the movements of the injection cock, substantially in the manner and for the purpose herein set forth.

Third, The so-arranging the parts of the pressure cock or valve and of the injection cock or valve, and their several connections that the injection orifice may be increased and diminished without effecting the pressure orifice, and yet so that by an additional movement of the same controlling means, after the injection orifice is closed, the pressure orifice may be opened with the effect herein set forth.

37,078.—Paul Schulze (assignor to himself and F. W. Billing), of Brooklyn, N. Y., for a Process of obtaining Printing Surfaces:

I claim the within-described process of drawing in soluble ink and treating such drawing for the several purposes herein specified.

[This process promises to be very valuable, as by it cheap substitutes for electrotypes of wood engravings and for etchings on steel or copper are obtained. It can also be used to obtain photographic negatives without a camera, and to make dies or seals. We are unable at present to publish an intelligible description of it. Patents have been secured in England and France through our agency.]

37,079.—Richard Uren, Thomas Dunstone and Joseph Blight, of Eagle Harbor, Mich., for an Improvement in Machinery for Manufacturing Safety Fuses:

We claim the arrangement of and mode of driving the several tubes and their flyer arms or guides and bobbins or spools, whereby both the yarns and tapes are laid, wound or twisted in opposite directions alternately and simultaneously, and the process of making the tape-covered fuse is enabled to be performed by a continuous operation, substantially as and for the purpose herein specified.

[This invention consists in so arranging and giving motion to the tubes and flyers or guides and spools or bobbins of a fuse-making machine as to lay the yarns and tapes in opposite directions alternately and simultaneously, by which means the process of making the tape-covered fuse is enabled to be carried on continuously.]

37,080.—J. M. Hancock, of Philadelphia, Pa., for an Improvement in Coal-oil Lamps:

I claim, first, Any suitable reservoir, D, in which is a tube forming an air passage, the latter being surmounted by a cap, H, and said reservoir having one or two wick tubes, C and C', when the latter are formed and arranged in respect to the opening in the top of the cap, substantially as specified, and when a supply of air is transmitted to the cap, through the aforesaid tube by the agency of a supplementary lamp.

Second, I claim the tube, E, and its reservoir, D, when the former is hinged to a suitable base, A, and is arranged to inclose a supplementary lamp, B.

Third, I claim the arrangement of the tube, E, tube, F, reservoir D, and cap, H.

37,081.—J. A. de Brame, of New York City, for an Improvement in Machinery for Separating Fibers from Plants:

I claim, first, so arranging the bearings of the cylinder, those of the drums which carry the endless belt and those of the feed rollers, as to leave the machine open on one side, substantially as and for the purpose herein set forth.

Second, So applying the upper feed roller as to enable its outer end to be raised to increase the opening between the two feed rollers at the open side of the machine without raising the bearing of said roller at the opposite side, substantially as and for the purpose herein specified.

RE-ISSUE.

1,357.—Benjamin Crawford (assignor to English, Bennett, Frisbee & Crawford), of Allegheny, Pa., for an Improvement in Steam Boiler Furnaces. Patented January 29, 1850:

I claim, first, The injection of whirling jets of steam among the gases evolved by the fuel on the grates, for the purpose set forth.

Second, Self-whirling adjutages, or their equivalents, on the pipes leading from the boiler or steam blower to proper positions for increasing the draft or promoting combustion, substantially as set forth.

Third, Whirling live steam for the purpose of increasing or maintaining the draft of a steam boiler furnace, substantially as set forth or the equivalent thereto.

Fourth, A combined stream of mingled steam and hot air introduced and forced into the ash-pit and up through the fire of a steam boiler furnace by means of the steam boiler and hot air and steam pipes which intersect one another and terminate in a discharging nozzle within the ash-pit, substantially as set forth or the equivalent thereto.

Fifth, Live steam blowers arranged in the flues of a steam boiler for the purpose of aiding the draft and blowing out the foul matter which accumulates in the flues.

Sixth, The combination of means, as set forth, for performing unitedly the several functions specified.

NOTE.—We recognize in the above list of claims the names of TWENTY-THREE patentees whose applications were conducted through this office.

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PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issue since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on design patents when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO.,
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PATENTS FOR SEVENTEEN YEARS.

The new Patent Laws, enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from **$30** down to **$15**. Other changes in the fees are also made as follows :—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting reference to such countries as discriminate against citizens of the United States—thus allowing Austrian, French, Belgian, English, Russian, Spanish and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

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The service we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fees by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co., No. 37 Park-row, New York.

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Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief story of the case, inclosing the official letters, &c.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

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Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats, in English and German, furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

Notes and Queries

J. L. of Wis.—We will give you the rule to calculate the horse-power of boilers, and you can then calculate the power of your own. Find out the number of square feet of heating surface, and allow 9 square feet for each horse-power. To find out the power of your engine, multiply the average pressure per square inch on the area of piston, into the speed in feet per minute and divide by 33,000. A horse-power means 33,000 pounds lifted 1 foot per minute. Your engine has a cylinder of 20 inches diameter, stroke of piston 20 inches and speed of 350 feet per minute, and carries 0 pounds of steam to the square inch. It is therefore 266 horse-power, and requires a heating boiler surface of 2,394 feet. One square foot of grate surface is allowed to each horse-power in mill-engines, but as you exhaust the steam into the smoke-stack 9 square inches will be sufficient. We prefer the fire-box style of tubular boilers similar to locomotives. If, upon trial, you find this amount of grate surface too large, you can easily contract it to 6 square inches per horse-power. The above-stated power is calculated according to the common rule ; but in all likelihood your engine will not work up to half this capacity. Common rules for calculating the power of engines are not followed in practice.

A. R. C., of N. Y.—You should purchase an electro-magnet to make your experiments, instead of making one yourself, because it requires nicely-adjusted machinery to run on the wires properly. Use the finest-covered wire, made with pure copper, and place a piece of dry paper between each coil. A battery of intensity is made with a large number of cells and small plates; a battery of quantity is made with large surfaces or plates. A coarse wire on helices forms a magnet of quantity ; a fine wire produces a magnet of intensity. The power of the magnet is in proportion to the number of coils and the strength of a compound battery. Use a short wire with a simple battery and a long wire with a compound battery.

C. A. R., of Va.—You inquire for a mode of making light porous fabrics, such as lawn and calico goods, "combustible and water-proof." We suppose you mean "*in*combustible," because you can easily make them very combustible and water-proof by coating them with boiled oil. They cannot be rendered perfectly water-proof and incombustible at the same time maintaining their porosity; but they can be rendered partially so by immersing them in a hot solution of alum and drying them in a warm room.

L. S. W., of Mass.—A composition of 1 pound of mutton suet, 1 ounce of yellow bee's wax and ½th of an ounce of powdered gum shellac, is excellent for harness leather to keep it soft and water-proof. These substances are to be dissolved under heat in an earthenware vessel, and applied warm with a sponge or a rag. The harness should be blackened with common shoe blacking and brushed before this composition is put on. Black lac varnish makes leather brittle. Excepting patent leather varnish, which is dried under heat, all the other applications known to us, for harness and shoe leather, wear off with use and require frequent renewal.

J. S. J., of Cal.—E. M. Archibald, Esq., of this city, is the proper person to address for information in regard to Paine's engine.

S. W. F., of R. I.—We do not now remember the address of the correspondent who inquired about the writing-machine. Such communications we do not ordinarily preserve, for the number of them is legion.

G. V. M., of Pa.—It appears to us that your improvement in coal scuttles is new. You had better send us a sketch and description, and have an examination made at the Patent Office.

J. D. of Ohio.—There is no published work that contains illustrations of all the tools used in the manufacture of rifles, accompanied with descriptions.

H. E. of N. J.—The benzine of petroleum may remove the copal varnish which has been spilt on your valuable oil painting, but it must be managed with great care or the colors in the painting will also be removed. It is an unfortunate case, and you had better consult a professional picture artisan.

T. A. B., of Mass.—We have received your samples of bleached and colored jute, hemp and flax. They are very beautiful. The only way to bring your new process of bleaching before the public is to advertise.

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At the Scientific American Office on account of Patent Office business, from Wednesday, December 3, to Wednesday, December 10, 1862 :—

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Persons having remitted money to this office will please to examine the above list to see that their initials appear in it, and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or express.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from December 3, to Wednesday, December 10, 1862:—

J. E. V. W., of N. J.; L. G., of N. Y.; B. & B., of Cal.; J. A. R., of N. J.; E. M., of N. Y.; A. N. P., of Ill.; A. M., of N. Y.; S. D., of Pa. (2 cases); G. A. D., of Cal.; W. D., Jr., of Pa.; H. W., of Pa.; F. S., of Ill.; E. L., of Bohemia; C. R., of Mich.; A. G., of Maine; C. R. O., of Conn.; G. A., of Pa.; E. G. A., of Mass.; R. E., of Ill.; C. G. O., of N. Y.

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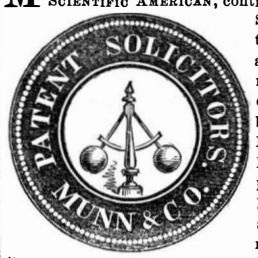
IMPORTANT TO INVENTORS.

MESSRS. MUNN & CO., PROPRIETORS OF THE SCIENTIFIC AMERICAN, continue to solicit patents in the United States and all foreign countries, on the most reasonable terms. They also attend to various other departments of business pertaining to patents, such as Extensions, Appeals before the United States Court. Interferences, Opinions relative to Infringements, &c. The long experience Messrs. MUNN & Co. have had in preparing Specifications and Drawings, extending over a period of sixteen years, has rendered them perfectly conversant with the mode of doing business at the United States Patent Office, and with the greater part of the inventions which have been patented. Information concerning the patentability of inventions is freely given, without charge, or sending a model or drawing and description to this office.



Consultation may be had with the firm between NINE and FOUR o'clock, daily, at their PRINCIPAL OFFICE, No. 37 PARK ROW, NEW YORK. We have also established a BRANCH OFFICE in the CITY OF WASHINGTON, on the CORNER OF F AND SEVENTH STREETS, opposite the United States Patent Office. This office is under the general superintendence of one of the firm, and is in daily communication with the Principal Office in New York, and personal attention will be given a the Patent Office to all such cases as may require it. Inventors and others who may visit Washington, having business at the Patent Offices are cordially invited to call at their office.

They are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business they have Offices at Nos. 66 Chancery Lane, London; 29 Boulevard, St. Martin, Paris, and 26 Rue des Eperonniers, Brussels. We think we may safely say that three-fourths of all the European Patents secured to American citizens are procured through our Agency.

A pamphlet of information concerning the proper course to be pursued in obtaining Patents through their Agency, the requirements of the Patent Office, &c., may be had gratis upon application at the Principal Office, or either of the Branches. They also furnish a Circular of information about Foreign Patents.

The annexed letters from former Commissioners of Patents we commend to the perusal of all persons interested in obtaining Patents:—

MESSRS. MUNN & Co.:—I take pleasure in stating that while I held the office of Commissioner of Patents MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE came through your hands. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill and fidelity to the interests of your employers. Yours, very truly, CHAS MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster General of the United States, he addressed to us the subjoined very grateful testimonial:—

MESSRS. MUNN & Co.:—It affords me much pleasure to be t sti mony to the able and efficient manner in which you discharged your duties as Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy marked ability, and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

MESSRS. MUNN & Co.—*Gentlemen:* It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your Agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, WM. D. BISHOP.

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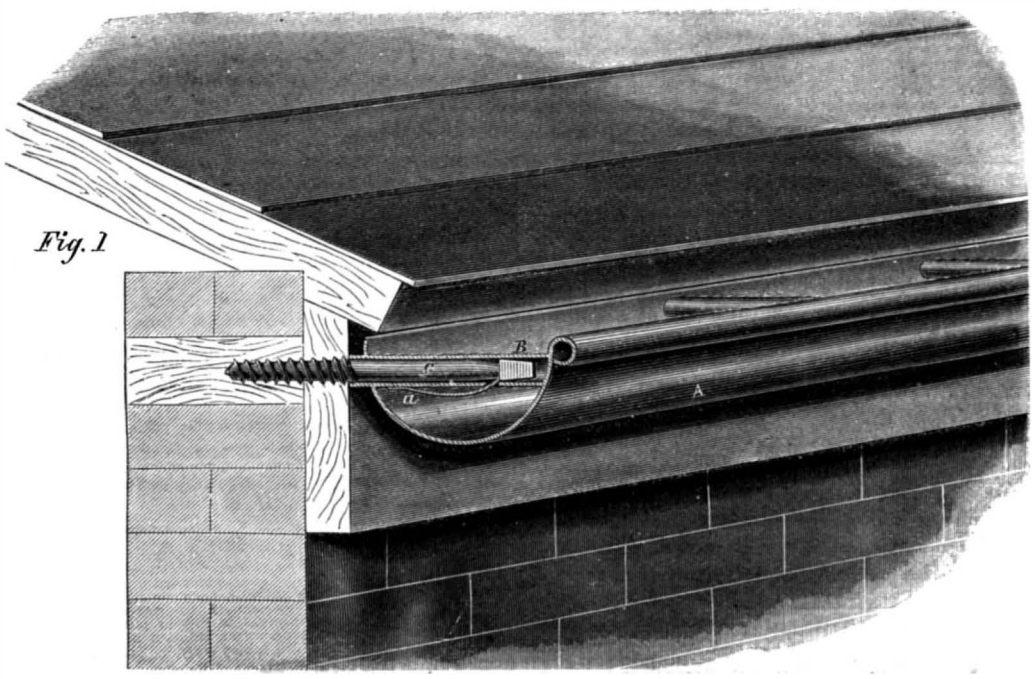
Improved Patent Gutter.

We publish this week, for the benefit of our readers, an engraving of an improved mode of hanging gutters or the eaves-troughs of buildings. It consists of the ordinary metal gutter, A, provided at certain distances with tubes, B, which are open at one end and closed at the other. These tubes are slipped over the points of bolts, C, which are screwed into the frame of the house. Upon the under side of the pipe, B, is a small spring *a*, which works through a slot in the tube aforesaid, and takes against the shoulder of the bolt, C; it is thus kept securely in its position, and the danger of being blown off or detached in any way is entirely obviated.

Fig. 1

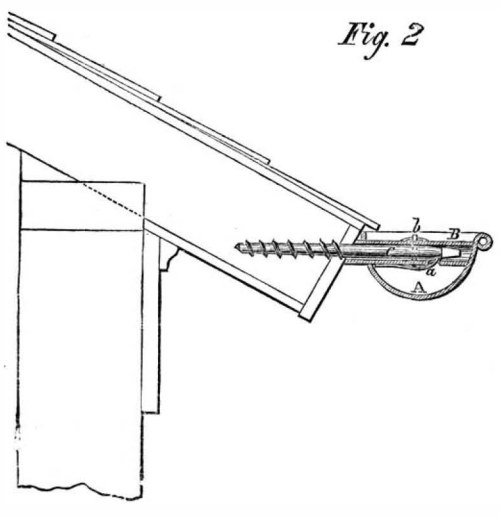


YAPP'S PATENT GUTTER.

Fig. 2 shows a section of the roof and eaves-trough, with the plan of attachment, very plainly. In this instance the bolts, C, are screwed into the rafters of the roof. This is necessary in some styles of architecture, as the rain drip would entirely overshoot the gutter were it in any other position. Another mode of fastening the trough to the bolt is proposed and here illustrated. It is simply the substitution of the pin, *b*, shown in dotted lines, for the spring.

The arrangement of this apparatus is very neat and tasty. It is also stronger than the old method, does

Fig. 2



not injure the shingles, and is easier to adjust in its place. Any kind of metal may be used in constructing the gutter, or any modification of shape desired, to correspond with the architecture of the edifice, can be given it.

The patent for this invention was procured through the Scientific American Patent Agency, Nov. 4, 1862, and further information can be obtained by addressing Wm. Yapp or J. P. Abbott, Box 2,434, Cleveland, Ohio.

Hamburg International Agricultural Exhibition, 1863.

Agricultural exhibitions, more especially cattles shows, seldom interest beyond the immediate localities in which they are held; but the committee of the Hamburg association have decided that their next display shall be an international exhibition. A glance at the map shows Hamburg to be connected by rail and steamer with all the principal cities of northern Europe, as also by ocean steamers with New York and other foreign cities. American manufacturers will, therefore, have every facility for exhibiting their products; and it is particularly requested that all those who intend to compete should make their application to the Secretary, Dr. G. Hachman, at Hamburg. All necessary information will be supplied by Messrs. Austin & Baldwin, of the American and European Express, 72 Broadway, New York City. Their advertisement will be found on another page.

AN EFFECTIVE RAT TRAP.

A correspondent in St. Louis, Mo., seeing an article in our paper a few weeks since, relating to the destruction of rats, thinks that he cannot do his country more service than by publishing his experience with rodents. He takes a small barrel, and covers it with green hide, upon the fair and honest surface of which he nightly spreads a banquet to which all rats

of high and low degree straightway throng. This free lunch is continued for a number of nights until the pests aforesaid have come to look upon it as a settled "institution." When this point in the plot is achieved, two slits are cut in the hide at right angles with each other, and the viands set out as before. Now when the doomed vermin rally at night, all unsuspecting of disaster, they leap immediately upon the treacherous skin and fall plump into the water with which the barrel is half filled; once there, they swim to a stone that rears its friendly summit above the flood and forthwith squeal vociferously. Other rats, being socialists by nature, immediately rush to the aid of their distressed fellow-sufferers, but by reason of the hide resuming its normal position after each victim's disappearance, the whole brood are involved in one common ruin; at least so says our informant, and he further adds that he has destroyed either 11 or 77 (his figures stand for either) in one night.

This trap is similar in some respects to the one alluded to in our former article; the substitution of the untanned hide in this, however, for the swinging head in ours, doubtless makes it more effective. A smart rat might save himself by jumping from the latter arrangement; but no amount of "ground and lofty tumbling" could avert his fate through the slits.

Our engraving explains the trap very clearly, and we hope that those afflicted with rats may find relief by adopting the remedy of our correspondent.

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To the Inventor!

The SCIENTIFIC AMERICAN is indispensable to every inventor, as it not only contains illustrated descriptions of nearly all the best inventions as they come, but each number contains an Official List of the Claims of all the Patents issued from the United States Patent Office during the week previous; thus giving a correct history of the progress of inventions in this country. We are also receiving, every week, the best scientific journals of Great Britain, France and Germany; thus placing in our possession all that is transpiring in mechanical science and art in those old countries. We shall continue to transfer to our columns copious extracts from those journals of whatever we may deem of interest to our readers.

Chemists, Architects, Millwrights and Farmers!

The SCIENTIFIC AMERICAN will be found a most useful journal to them. All the new discoveries in the science of chemistry are given in its columns, and the interests of the architect and carpenter are not overlooked; all the new inventions and discoveries appertaining to those pursuits being published from week to week. Useful and practical information pertaining to the interests of millwrights and millowners will be found published in the SCIENTIFIC AMERICAN, which information they cannot posstbly obtain from any other source. Subjects in which planters and farmers are interested will be found discussed in the SCIENTIFIC AMERICAN; most of the improvements in agricultural implements being illustrated in its columns.

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